101-50

OVERSIGHT OF EPA'S SUPERFUND INNOVATION TECHNOLOGY EVALUATION [SITE] PROGRAM

HEARING

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

JULY 17, 1989

[No. 50]

Printed for the use of the
Committee on Science, Space, and Technology

READEX MICROFICHE best copy available

U.S. GOVERNMENT PRINTING OFFICE
21-876 WASHINGTON : 1989

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CONTENTS

WITNESSES

July 17, 1989:

	Page
John Skinner, Office of Research and Development, Environmental Protection Agency	6
Ed Putnam, New Jersey Department of Environmental Protection	42
John W. Liskowtz, professor of environmental engineering, New Jersey Institute of Technology; accompanied by Dan Watts, Associate Director of the National Science Foundation, Industry University Cooperative Research Center	49
Richard C. Fortuna, executive director, Hazardous Waste Treatment Council	64
Carl Brassow, president, Soliditech of Houston, TX	75
James J. Malot, president, Terra-Vac, Inc	81
Appendix	94

OVERSIGHT OF EPA'S SUPERFUND INNOVATION TECHNOLOGY EVALUATION [SITE] PROGRAM

MONDAY, JULY 17, 1989

HOUSE OF REPRESENTATIVES, COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT,

Washington, DC.

The subcommittee met, pursuant to notice, at 9:28 a.m., in room 301-A, Bergen County Board of Chosen Freeholders Administration Building, Hackensack, New Jersey, Hon. James H. Scheuer presiding.

Present: Representatives Scheuer, Torricelli.

Mr. SCHEUER. The oversight hearing on EPA's SITE program will commence now and the Subcommittee on Natural Resources, Agriculture Research and Environment will come to order.

Today we are having an oversight hearing on EPA's SITE program. The Superfund Innovative Technology Evaluation Program, which is the brain child of Congressman Bob Torricelli of New Jersey.

Four years ago, following the debacle of Anne Burford and Rita Lavelle, EPA's Superfund Program was truly on the ropes. It had received what was tantamount to a knockout punch.

Despite billions of dollars spent on clean-ups, not one of the hundreds, in fact of the thousands of Superfund sites had finally been cleaned up, not one. Of even greater concern, the clean-ups themselves were little more than a toxic shell game. Because what was happening was that wastes, instead of being permanently removed, would be simply carted from one site to another, covered up with temporary caps.

The net result was that we really were not, in any practical sense, reducing the risks from hazardous waste, we were only shifting the risks of hazardous waste from one town to another and from one generation to another. Clearly we needed a new plan.

Against this backdrop, in 1986 Congress rewrote the Superfund law and included in that law was a provision passed by this Subcommittee and authored by this distinguished member from New Jersey, Bob Torricelli.

And this provision was intended to put a stop to the toxic shell game by creating a research and demonstration program for innovative and alternative treatment technologies, which would really destroy wastes and not simply spread them around.

Now, three years later, it is time for us to take a look at how this program is working. This program is called SITE, Superfund Innovative Technology Evaluation.

I am very pleased to be able to hold this hearing in the district of the author of this important legislation, Congressman Bob Torricelli. I can tell you that throughout his time in Congress, Bob has been a great leader on the environment issue. At every turn, at every opportunity, where leadership was demanded, he has been there as a voice for rationality, as a voice for the future, as a voice for a livable planet, and the citizens of this district can be very proud of their representative in Congress.

I would now like to call on my colleague from New Jersey, Congressman Torricelli, to take the gavel and chair the remainder of the hearing.

Mr. TORRICELLI. Thank you, Mr. Chairman, and thank you very much for holding this field hearing and for your generous statements, and of course for your leadership which allowed this committee in 1986, to draft critical amendments to the Superfund Authorization bill, permitting this program to be created.

The SITE Program was created by our committee to promote innovative technologies to better handle 240 million tons of toxic waste generated in the United States every year.

Today, most of the nation's waste is being treated by incineration. This technique has disadvantages because it is extremely energy-intensive and, through flaws in the feeding system, toxic gasses escape. Taking other materials to landfills has no other advantages.

This committee found in its original hearings that some 85 percent of all landfills were themselves suspected at one point or another of leaking and becoming Superfund sites in the future.

This issue is obviously, Mr. Chairman, particularly important to our State of New Jersey, because of the extent of our toxic waste sites. New Jersey tragically leads the nation with 107 sites on the National Priorities List, out of 890 nationally. Very recently one was just added in our own district, Industrial Latex Corporation in Wallington, right here in Bergen County.

In fact, importance of the program is even better demonstrated by the fact that three of the sites, where the SITE Program is testing technologies are right here in New Jersey.

The goal of this program, I suppose, is several. First, to establish the office to conduct demonstration tests; to study those results and publish the findings, so that local authorities may choose which technologies they want to use. Since the inception of the program and the pursuit of each of these goals, 42 different technologies have been selected for testing; 10 of these have now been demonstrated. However, members of the committee have noted since our action in 1986, a variety of problems, many of which were not anticipated.

First, developers appear concerned about the amount of time it is taking to find sites that are suitable for the technology to be tested. Second, some of those companies scheduled to have their technologies tested, encounter potential problems they are not ready for. For example, if they are told that the test site will contain rocks, certain soils, tree stumps, and they find that their treatment tanks

facilities cannot accommodate them. Three, it simply takes too long for reports to be produced. And fourth, it is difficult for developers to get into SITE. EPA requires data, which can only be obtained by actually performing the tests themselves and which it is difficult to test, without having the waste available from the sites.

As a result, many, indeed I think we could say most, developers have chosen to bypass the SITE Program because of these problems and sell their technologies directly to project managers.

Also, there has been an institutional bias in SITE, which tends to emphasize only the good aspect of demonstrations. As a result, some technologies can end up being used under non-optimal conditions.

There is also not enough reverse communication from Superfund, telling SITE which technologies should be sought after, which are most appropriate, the most needed.

Therefore, Mr. Chairman, three years into this program, which was created under your leadership, there are a variety of questions. As we suspected in the initial hearings, there are critical breakthroughs in technology in Japan and Europe and in the United States to deal with the hazardous waste problems. Science is finding answers as we first suspected. It is also clear that those answers are living up to much of their promise, but they are not coming on-stream fast enough; there appears to be too much resistance to new technologies, too much problems in their administration, there are difficulties with the program.

The question is why, if there are changes in the law required to make it operate better, what can slow the time between the laboratory and the actual operations in the field. It is our hope to find an answer to some of those questions today, to determine whether or not this committee should return, change the law in any way, change the mandate of the Environment Protection Agency, or in some ways we can somehow make this more successful.

[The prepared statement of Mr. Torricelli follows:]

STATEMENT OF THE HONORABLE ROBERT G. TORRICELLI
ON THE SUPERFUND INNOVATIVE TECHNOLOGIES (SITE) PROGRAM

July 17, 1989

* The purpose of this hearing is to review the purposes of the Superfund Innovative Technologies (SITE) program and why it is important, and to assess how the Environmental Protection Agency (EPA) is fulfilling its mandate to implement and improve the program at an adequate pace.

* The SITE program was created by an amendment, sponsored by Congressman Robert Torricelli, to the 1986 Superfund Authorization Bill.

* This program has been discussed previously at a hearing on managing hazardous waste before the House Energy and Commerce Subcommittee on Transportation and Hazardous Materials. The hearing was held at Stevens Institute of Technology in Hoboken, N.J. on December 7, 1987.

* At that time the program was in its infancy. Now we have the opportunity to assess the progress EPA has made with the SITE program since that time.

* The SITE program was created to promote innovative technologies to better handle the 240 million tons of toxic waste generated in the U.S. each year.

* Today, most of the nation's waste is treated by incineration. This technique has disadvantages because it is extremely energy intensive and through flaws in the feeding systems, toxic gases escape.

* This issue is particularly important to N.J. because of the extent of its toxic waste sites.

* N.J. leads the nation with 107 sites on the National Priorities List (NPL) out of 890 nationally. One of the newest additions to the NPL is the Industrial Latex Corporation site in Wallington.

* In fact, 3 of the sites where the SITE program is testing technologies are in N.J. with locations at Imperial Oil Co., Goose Farm, and Syncon Resins, which is scheduled for demonstration in August in nearby South Kearny.

* The SITE Program has been operating since January 1986 (Since before Superfund was passed). The goal of the office is to conduct demonstration tests, study the results and publish the findings so that local authorities may choose which technology they want to use.

* Since the program's inception, 42 different technologies have been selected for testing. Ten of these have been demonstrated.

* The technologies for which demonstrations have been completed include Infrared Incineration, Solidification, Pyretron Oxygen Burner, Vacuum Extraction, In Situ Solidification, Solvent Extraction, and Ultraviolet Radiation/Ozone.

* Of the completed demonstrations, 3 are fully closed with accompanying Demonstration Results reports and Applications Analysis reports while another 3 have accompanying Demonstration Results reports and are awaiting completion of the Applications Analysis reports.

* During evolution of the SITE program, a number of problems have arisen.

* For instance, developers are concerned about the amount of time it takes to find sites that are suitable for the technology to be tested.

* Some of the companies scheduled to have their technologies tested encounter potential problems they are not ready for. For example, if they are told that the test site will contain tree stumps and rocks, etc. they may find that their treatment tanks/facilities cannot accommodate them.

* It takes too long for reports to be produced.

* It is difficult for developers to get into SITE . EPA requires data which can only be obtained by performing tests which is difficult without waste to perform on. Perhaps EPA should supply developers with waste to do preliminary experiments.

* Many developers bypass SITE because of the slowness of the program I sell their technologies directly to RPMs and project managers.

* Institutional bias in SITE tends to emphasize only the good aspects of demonstrations. As a result, some technologies can end up being used under non-optimal conditions.

* Their is not enough reverse communication from Superfund telling SITE which technologies should be sought after, like radiation treatment for New Jersey.

Outlook:

* EPA has basically admitted that they have been too slow in the past and they have been attempting to improve the rate at which they complete projects and distribute information.

* For example, EPA wants to provide Project Managers with assistants in charge of recommending alternative technologies. They would be the ones to read the SITE reports.

* EPA claims to be using more technologies at its Superfund sites. In 1986, 45% of the Records of Decision (RODs) selected treatment technologies. This figure was 72% in FY88. However, most of these are not the result of SITE, but of developers selling their technology.

Mr. TORRICELLI. Mr. Chairman, I look forward to hearing from each of our three panels of witnesses and having the opportunity to question them. And I thank you again for calling this hearing.

Our first witness list, the first panel will be John Skinner, Office of Research and Development, United States Environmental Protection Agency; Steve Luftig, Director of Emergency and Remedial Response Division, Environmental Protection Agency Region II. Would you both please take a seat.

Mr. Skinner, I understand you have an opening statement?

Mr. SKINNER. Yes, Mr. Chairman, I do.

Mr. TORRICELLI. If you would please, it will be entered in the record in full, so you may summarize or take excerpts from it at your pleasure.

STATEMENT OF JOHN SKINNER, OFFICE OF RESEARCH AND DEVELOPMENT, ENVIRONMENTAL PROTECTION AGENCY

Mr. SKINNER. Thank you, thank you very much Congressman Torricelli, Congressman Scheuer, for holding this hearing. It is a pleasure to appear before you and to discuss the SITE Program. This subcommittee has always been a very strong supporter of Research, Development and Demonstration at EPA, and we appreciate their assistance and leadership throughout the years in these areas.

I will just summarize my prepared statement in order to save time. And Mr. Luftig will be available to answer any questions from a regional perspective, as to how the regional offices view the SITE Program and how they actually make selections of technologies.

As you know the SITE Program has been active for two and a half years now, and its purpose is to expand the use of permanent treatment technologies and Superfund cleanups. Technologies that will destroy wastes, that will detoxify wastes and will permanently solve the problem.

There is a very unique approach in the SITE Program in terms of public-private partnership, where SITE developers are expected to operate their technologies at their own expense during the demonstration and we do the entire testing and analysis and prepare reports on the performance of the technology. And these data coming out from these demonstrations are critical information for use by the regional project offices in making selections.

There are five elements to the program; let me just hit the highlights of each of them very very quickly. The demonstration part of the program is the real heart of the SITE Program, it is where we do real world, full-scale testing of the technologies under field conditions. We have 42 active projects in the demonstration part of the program. We have received over 140 proposals over the two and a half years of the program and as I said we have 42 active projects, 11 of those 42 were selected since last March. So there appears to be considered industrial interest in the program and every time we go out on a solicitation we obtain additional projects into the program.

Ten of those demonstrations have been completed. Nine more will be completed by the end of this year, which will bring the total

demonstrations to 19 out of the 42. Three of those projects are here in New Jersey. The Solidtech project at the Imperial Oil Champion Chemical site was completed earlier this year, there will be some testing done this week, some long term testing at the site.

There is a project in South Kearney at the Syncon Resin Site, Zimpro Technology, which uses powdered activated carbon plus biological treatment and also a project in Plumstead Township at the Goose Farm site to see if coal dust will demonstrate biological degradation.

The emerging technology part of the program deals with those technologies that are not yet ready for full scale application and we have 15 active projects in that part of the program. We have a monitoring and measuring element of the program where we are attempting to develop better ways of assessing sites and we have two very innovative technologies in terms of immuno assays and fiber optics for making measurements of chemical levels at sites at a low cost, very rapid method.

We have a part of the program which attempts to transfer EPA developed technologies to the private sector under the authorities of the Technology Transfer Act.

However, probably the most important part of the program is the technology transfer and information dissemination part of the program and let me spend a little bit of time on that. This program will not be successful unless the information that is developed from it is in the hands of the people that need to make decisions. This includes the regional project managers who will be managing projects in the region; the state agencies that are involved; local governments; potentially responsible parties; and, citizens living around the sites. We've used a number of mechanisms in order to get the word out to these different groups, including technical reports, fact sheets. We will soon have an on line access computer data base which can be accessed to obtain information from the program. We have a hot line, where people can call in and ask questions about the program. We hold many seminars, we publish articles in journals. We place exhibits and make presentations at conferences and conventions across the country; we're always looking for new and more effective ways of getting the information out on this program.

We recently created what we refer to as the Alternate Treatment Technology Information Center and the acronym for that is ATTIC, which is an automated information system on alternative treatment technologies, including our SITE projects. And this ATTIC information system is currently accessible through a telephone hot line and it will be accessible through personal computers in the very, very near future.

We have a number of publications that have been put out on the program. The two most important are the demonstration reports and the applications analyses reports. The demonstration reports are the results of the SITE demonstration at a particular site. The applications analyses reports are reports which project how these technologies can be used elsewhere at other sites. And we have 10 of those reports out, six demonstration reports and four application analyses reports.

We have had some start-up issues that we have had to deal with in the program, and, to be frank with you, we have not been pleased with the pace of the program over the early years and have made some management decisions and taken some action in order to accelerate the program. And let me just hit the highlights of several things that we've done.

First of all we were not satisfied with the rate at which we were getting reports out and we now have a rigid reporting schedule, which everyone adheres to, the project officer on the demonstration, the developer and all of the people who have to review and approve the report before it is issued. And because of that, we've reduced the time of getting out our reports by 33 percent.

We were unsatisfied at the rate at which projects were being brought into the program and at the rate at which sites were being selected for the demonstration. And we have now developed the fast track part of the program, where those technologies which have a host SITE will be accepted into the program any time that they are ready to start. They will not have to wait for the annual solicitations. We have also reduced the time for SITE selection by 20 percent. Our goal, to reduce the total time for the entire demonstration from the time the project is first selected, to the time the reports have been issued, we would like to accomplish that in no longer than 18 months. So far, we have reduced that by 24 percent, but we are still aiming for that goal.

I think that we did have some early delays in getting the program going, but I think the program has reached its steady state. Technologies are coming into it on a steady state and we are putting reports and information out on a steady state. And as a result of that, and I think as a result of the way the program is being managed in the regions, you have seen increased use of treatment technologies at Superfund sites as compared to in the past.

Let me conclude by saying I think the SITE Program has been a successful experiment; it will be much more valuable in the future, as more and more results are getting out. I think it is a good model for the use of innovative technologies in environmental protection overall, and I really appreciate the leadership shown by this committee in providing us with the authority we needed in order to carry out this demonstration. If it was not for the amendments that this committee passed in the Superfund legislation, we would not have this program today. Thank you.

[The prepared statement of Dr. Skinner follows:]

TESTIMONY OF
DR. JOHN SKINNER
ACTING DEPUTY ASSISTANT ADMINISTRATOR
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT
OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

JULY 17, 1989

Good morning. I am John Skinner, Acting Deputy Assistant Administrator of EPA's Office of Research and Development. I would like to discuss with you this morning the progress we have made in the Superfund Innovative Technology Evaluation (SITE) Program, and the steps we are taking to increase the SITE Program's effectiveness.

As you are aware, the SITE Program is now two and one-half years old. In these two and one-half years, the program has become a cornerstone of EPA's efforts to encourage the development and use of more effective, permanent treatment technologies at Superfund sites. We are pleased to report that we have begun to see a shift toward these technologies in cleanup actions. Prior to the 1986 Superfund Amendments and the SITE Program, the use of innovative technologies as alternatives to land disposal was low. Of the 60 Records of Decision (RODS) signed in Fiscal Year 1986 to control contamination sources (as opposed to groundwater control), only 27, or 45%, selected treatment technologies. Two years later, in Fiscal Year 1988, 68 of these RODS (72%) selected alternative treatment technologies, which included incineration, stabilization and solidification, vacuum extraction, soil aeration, soil washing, and biodegradation. Incineration was selected for 26 sites, stabilization and solidification for 18 and vacuum extraction was chosen for 10 sites. Some SITE technologies have been selected for

Superfund site cleanups, and other developers in the program are bidding on cleanups.

Interest in the use of alternative technologies is clearly increasing. The climate has improved for considering these technologies along with conventional ones as methods are chosen for Superfund site cleanups. EPA headquarters and SITE program managers receive numerous requests for information on alternative technologies, and the volume of requests continues to increase. We receive calls from Regional Offices, state and local agencies, domestic and international engineering firms, cleanup contractors, and the general public. Over 100 requests per week are received for information on the program, including the demonstration and emerging technology projects.

The recently completed Management Review of the Superfund Program that was called for by Administrator William Reilly, was also supportive of the use of innovative technologies. The report strongly supports the SITE program and presents recommendations aimed at strengthening it. I will elaborate on some of these recommendations later.

Let me give you a little background on the SITE Program and then bring you up to date on where we now stand. I will conclude my testimony by discussing some of the problems we have encountered in implementing this program and the steps we have taken to overcome these problems.

BACKGROUND

Prior to the enactment of the Superfund Amendments and Reauthorization Act (SARA), Congress recognized that our experience with treatment technologies was very limited and that very few technologies were fully developed and ready for off the shelf use.

At the same time, many technology developers were making optimistic claims regarding their ability to clean up Superfund sites. The problem, of course, was a reluctance on the part of states, Potentially Responsible Parties, and cleanup contractors to select an untested technology for a remedial or removal action. Few people were willing to take the risk that was involved in such a decision. Thus, the basic idea behind the SITE Program is reduction of risk associated with using untested technologies. By providing reliable, realistic data on the actual performance of a technology in a controlled situation, EPA reduces the risk that is involved in choosing that technology for use at a Superfund site. SITE Program demonstrations build confidence that the technology will be capable of doing what its developers claim it will do, and EPA's reports on the demonstration discuss the potential applications of the technology in a variety of settings.

The Demonstration Program is the primary component of SITE. It has received the most money and effort. Other components are also important, adding to the comprehensive effort to encourage the use of more permanent cleanup technologies. These other components are the Emerging Technologies Program that is designed to ensure a steady stream of technologies for demonstration, the Measurement and Monitoring Technologies Program that is developing better methods of assessing contamination and effect of remedial efforts at Superfund sites, and the Innovative Technologies Program that encourages private sector adoption of innovative technologies developed by EPA. A final component that supports all of these efforts is the Technology Transfer Program, which includes technical assistance and information dissemination.

DEMONSTRATION PROGRAM

I will begin my status report with the SITE Demonstration Program. This program is a joint effort of EPA and private industry. The developer supplies the technology and is responsible for transporting the equipment to the site, operating the equipment during the demonstration, and decontaminating and removing the equipment from the site. The demonstrations last anywhere from several days to six months, depending on the type of technology. For the 10 completed demonstration projects, the private sector developers have invested more than $8 million in capital equipment and nearly $2 million in operation and maintenance to support the demonstrations. If the developer is unable to finance the entire cost of the demonstration, EPA will consider sharing these costs. However, the tests for receiving these funds are rigorous. I should note that we have not had any requests for funds thus far.

To date, ten technology field demonstrations have been completed. These projects included three thermal, four solidification/stabilization, and three physical/chemical processes (see Table I). In addition, we expect nine field demonstrations to occur this year. These projects also represent a wide variety of innovative technologies (see Table II).

EPA's role in the program is to evaluate the performance of the technology during the demonstration, collecting samples to determine how well the technology treats the various contaminants. EPA then prepares two separate reports on our findings. The first report, the Demonstration Evaluation Report, presents the data on technology performance. For example, what was the destruction and removal efficiency for PCBs? Were any contaminants found in the waste water or stack emissions? The second report, the

TABLE I

COMPLETED SITE DEMONSTRATIONS

DEVELOPER	TECHNOLOGY	LOCATION/DATE
1. Haztech	Infrared Incineration	Brandon, FL July 31-Aug. 5, 19
2. Hazcon	Solidification	Douglassville, PA Oct. 12-16, 1987
3. Shirco	Infrared Incineration	Rose Township, MI Nov. 2-13, 1987
4. American Combustion	Pyretron Oxygen Burner	Jefferson, AR Nov. 16, 1987-Jan 29, 1988
5. Terra Vac	Vacuum Extraction	Groveland, MA Feb. 11-Apr. 8, 1988
6. IWT/GeoCon	In Situ Solidification	Hialeah, FL April 11-16, 1988
7. CF Systems	Solvent Extraction	New Bedford, MA Aug. 29-Sept. 2, 1988
8. Soliditech	Solidification	Morganville, NJ Dec. 5-9, 1988
9. Chemfix	Solidification	Clackamas, OR March 6-12, 1989
10. Ultrox	UV/Ozone	San Jose, CA April 15-17, 1989

TABLE II

UPCOMING FIELD DEMONSTRATIONS

DEVELOPER	TECHNOLOGY	LOCATION/DATE
1. Biotrol, Inc.	Aqueous Biological	MacGillis & Gil Site, MN July, 1989
2. Freeze Technologies	Separation by Freezing	Stringfellow Site, CA August, 1989
3. Zimpro/ Passavant, Inc.	Powdered Activated Carbon, Biological, and Wet Air Oxidation	Syncon Resin Site, NJ September, 1989
4. Biotrol, Inc.	Soil Washing and Biological	MacGillis & Gibb Site, MN September, 1989
5. Retech, Inc.	Plasma Heat	Silver Bow Creek Site, MT November, 1989
6. E.I. Dupont deNemours, Inc.	Aqueous Micro-filtration	Palmerton Zinc Site, PA Fall, 1989
7. Ogden Environmental Services	Circulating Fluidized Bed	McColl Site, CA Fall, 1989
8. Chemical Waste Management, Inc.	Low-Temperature Thermal Desorption	Kettleman Hills, CA Fall, 1989
9. Toxic Treatments, Inc.	In-situ Steam/Air Stripping	San Pedro, CA Fall, 1989

Applications Analysis Report, discusses the potential applications of the technology. This report is designed to assist potential users in making sound judgments as to the applicability of a technology to a given site and then to compare the technology's effectiveness and cost to other alternatives. These reports identify the limitations of the technology as well as its capabilities, the need for pre-and post-processing of wastes, the types of contaminants that can be treated, the media to which the technology can be applied, potential operating problems, and the approximate capital and operating costs.

Since we began the SITE Program two and one-half years ago, we have conducted four rounds of solicitations for the Demonstration Program. These solicitations have brought us a total of 140 proposals. We have carefully reviewed all of these proposals, weeding out those that address technologies that are already commercially available and those that are not ready for field demonstration. To date 46 technologies have been accepted into the program. Let me describe for you a couple of these technologies and the promise they offer for cost-effective, permanent cleanup of Superfund sites.

The Terra Vac vacuum extraction demonstration is a good example of the effect the SITE program can have. Vacuum extraction offers the advantage of treating waste in situ to remove volatile organics from soil. The Terra Vac technology was demonstrated at the Groveland Wells Superfund site in Massachusetts. Cooperation among all parties involved in the demonstration was excellent from start to finish. The Massachusetts Department of Environmental Quality and the Potentially Responsible Party were very interested in the outcome.

The demonstration treated soil contaminated with trichloroethylene. It ran from February 1988 to the middle of April 1988. It was completed in time to influence the selection of the remedial technology in the ROD for the site. The demonstration was a success and showed that the technology could be applied under less than ideal climatic and geological conditions. As a result of the successful demonstration, the PRP has hired Terra Vac to remediate the site. Terra Vac has also been selected for at least three other cleanups -- Tinkham's Garage in Region 1, Tyson's dump in Region 3, and Verona Wells Field in Region 5.

Another demonstration that is being evaluated for a Superfund ROD selection is the Ultrox process. Region 9 is considering UV/oxidation for groundwater remediation at the Lorentz Barrel and Drum site in San Jose, California. The technology was included in the ROD in October 1988 with the stipulation that additional information was needed to plan and design the remediation. The data were needed by this summer. Through very close cooperation among SITE officials, the Region, and the developer, the demonstration was completed on March 10 and the data have been presented to the Region. This project is an excellent example of how quickly the SITE Program can respond when all parties cooperate. It took only nine months from selection of the process to demonstration, and data were given to the Region within two months of the completion of the demonstration.

One of our completed demonstrations which was conducted locally was the Soliditech solidification/stabilization process. This technology demonstration evaluation was conducted at the Imperial Oil Company/Champion Chemicals Superfund Site in Morganville, New Jersey in December 5-9, 1988. Nine cubic yards of oily soil contaminated with PCBs and lead were treated during

the demonstration. The Soliditech process mixes the waste material with proprietary additives, pozzolanic materials, and water in a batch mixer. Five different extraction and leaching tests performed on the solidified mass showed almost undetectable levels of contamination. This week we are investigating the long term structural integrity of the solidified mass at the site as part of our long term monitoring program. We invite you to visit the site and view this sampling if interested.

Let me describe one more project that is significant because it involves DOE as well as EPA. The Retech Centrifugal Reactor is a process that uses plasma heating to decontaminate solid waste contaminated with both organic chemicals and metals. The organic contaminants are thermally desorbed and destroyed by heat generated by a plasma torch in the centrifugal reactor. The torch creates enough heat to melt the solid material fed to the reactor. This vitrifies the soil and traps the metals into a nonleachable solid.

DOE expressed interest in testing the Retech process. The Magnetohydrodynamics Component Development and Integration Facility was selected. The facility is located on the grounds of the Montana Post and Pole and the Silver Bow Creek NPL sites. This project has become a joint effort of EPA and DOE, with close cooperation from Region 8, the Montana Department of Health and Environmental Sciences, and the City of Butte. The demonstration is expected to take place in November of this year.

This summer will be very productive for the SITE demonstrations with five projects scheduled. One of those demonstrations will be the Zimpro powdered activated carbon/biological process at the Syncon Resin Superfund site in South Kearny, New Jersey. This demonstration evaluation is scheduled to start in early September and I encourage you to visit this site. Another four demonstration

evaluations will begin this Fall. This will bring our total number of demonstrations to 19.

EMERGING TECHNOLOGIES PROGRAM

The Emerging Technologies Program is only in its second year of operation. It supports the development of bench scale technologies and the evaluation of pilot technologies that are not yet ready for full-scale demonstration. We anticipate that many of these technologies will be commercialized and feed into the SITE Demonstration Program for field testing and evaluation. There has been a lot of interest in this program. We have received 145 pre-proposals from developers and have selected 15 for participation. These projects include a wide range of technologies.

The seven projects initially funded are completing their first year of study. These projects are evaluating the use of man-made wetlands for biological treatment, chemical treatment combined with ultrafiltration, laser stimulated photo oxidation, a biological ion exchange resin to remove toxic metals and organics from degraded waters, and solvent washing, insitu steam extraction, and electro-acoustics to remove organic and inorganic contaminants from soils. Results to date are sufficiently encouraging to warrant second year funding for five and possibly six projects. The seventh, described below, is a one year project that has been successfully completed. Awards are currently being processed for eight new technologies from the second solicitation while several hundred requests for preproposals for the third solicitation were mailed July 7, in response to the largest expression of public interest to date in the Emerging Technology Program.

The first report on a project funded through this program is due out by December of this year. This report will discuss a biological sorption process, AlgaSORB, developed by Bio-Recovery

Systems of Las Cruces, New Mexico. The application of this new technology is the removal and recovery of heavy metal ions from groundwater. The process removes metal ions using algae in much the same way as an ion exchange technology. This technology can also be used as a pretreatment process for biological systems.

MEASUREMENT AND MONITORING TECHNOLOGIES DEVELOPMENT PROGRAM

The Measurement and Monitoring Technologies Development Program is designed to support Superfund site characterization efforts. Current analytical methods for monitoring toxic compounds involve a time delay between field and laboratory analysis or a costly, time-consuming separation of the mixture into its components prior to analysis. New technologies are being developed for rapid analysis in the field, and the appropriateness and potential of these technologies need to be demonstrated under field conditions. EPA laboratories are exploring these new methods for assessing the extent of contamination at a site, characterizing those contaminants, and evaluating the effectiveness of remedial and removal actions. The program has been directed by the EPA Environmental Monitoring Systems Laboratory in Las Vegas, Nevada. It is a ccoperative venture with the private sector and academia.

This program has focused on two areas of research, immunoassays for toxic substances and fiber optic sensing for in situ analysis. Immunoassays offer a less costly measurement method that could replace conventional GC/MS analysis in the field. This could result in significant cost savings. Through cooperative agreements with the California Department of Food and Agriculture, University of California at Berkeley and Davis, Acurex, Westinghouse Bio-Analytic Systems, and the University of Nevada Environmental Research Center, the SITE Program is supporting development of immunoassays for a variety of chemical compounds. Reports have been prepared on the Westinghouse pentachlorophenol immunoassay and

the Antox BTX screening immunoassay for benzene, toluene, and xylene. A field demonstration of the pentachlorophenol immunoassay is planned in conjunction with the Biotrol soil washing demonstration this summer.

Significant advances have also been made in the field of fiber optics. Fiber optic sensing devices offer the convenience of in situ analysis. They are easily transportable to hazardous waste sites and can, therefore, offer cost savings and quicker results. This program is currently focusing on the development of instruments and methods for rapid screening of wastes and waste sites for contaminants. EPA is developing portable instruments to make on-site measurements for aromatic contaminants, PNAs and PCBs. A fiber optic fluorometer was field tested and its performance was outstanding. This led to commercial production of an instrument for an underground storage tank detection system. The importance of our fiber optic research is being recognized and we are receiving invitations to publish our results in upcoming books.

INNOVATIVE TECHNOLOGIES PROGRAM

EPA's Office of Research and Development had been conducting research on innovative treatment technologies long before the SITE Program began. Several of these technologies have been developed and tested, and demonstrated in the field. The Innovative Technologies Program is an outgrowth of this earlier research. Our objective is to encourage private firms to commercialize these technologies for use at Superfund sites.

There are currently seven technologies in this program. EPA has held two Exhibitions in late 1988 and early 1989 to promote these technologies. Private firms that might be interested in a technology were invited to view videos of the technologies in operation, inspect the equipment, and obtain information on the

assistance available in commercializing the technologies. One Exhibition was held in Edison, New Jersey and the other in Monett, Missouri. The technologies featured at the Exhibitions were the Mobile Carbon Regeneration System, the Mobile Soils Washer, the Mobile In Situ Containment/Treatment system, and the Mobile Incineration System.

The objective of these efforts was to solicit interest and cultivate potential industrial partners who would be willing to commercialize the technologies or perform continuing research. The Federal Technology Transfer Act, P.L. 99-500 is the enabling legislation for these partnerships.

Two hundred seventy-nine (279) attendees registered for the Edison Trade Fair, representing over one hundred and fifty-four (154) companies or industrial organizations, forty-seven (47) persons representing some thirty-five (35) organizations traveled to Monett to witness the incinerator demonstration. A total of nine (9) proposals have been received on these technologies which were evaluated on the basis of technical capability, proposed financial and market strategies, and the ability of the organizations to develop and implement a commercialization and development plan.

Preliminary evaluations of these proposals are complete. Additional information is being requested from all the applicants in order to complete our assessments.

TECHNOLOGY TRANSFER

It is important to remember that there is another component of the SITE Program. We have been discussing the scientific or technological component. The second component, the Technology Transfer Program, is equally important. We must make sure that

information about these new technologies gets out to the people who need it. This includes all those who are involved in making decisions about cleaning up a particular Superfund site, such as people in the EPA Regional offices, state agencies, local governments, Potentially Responsible Parties, and the local citizens. EPA is using many different techniques for reaching these different groups of people. We are distributing technical reports and fact sheets, providing on-line access to information, running a hotline to provide answers to questions, holding seminars, publishing articles in journals, and placing exhibits and making presentations at appropriate conferences and conventions. And we are always looking for new and more effective ways to get our message out.

Our primary audience for this information is the people who select cleanup technologies for removal or remedial actions at Superfund sites. Since the early stages of the SITE Program, we have been using an electronic bulletin board and written reports to inform these people about the results of SITE demonstrations. The bulletin board provides up to date information on project status and summary results. In addition, EPA has recently created an Alternative Treatment Technology Information Center, or ATTIC, in addition to the bulletin board and written reports. ATTIC is an automated information system that identifies alternative treatment technologies, including our SITE projects. Through ATTIC, a user can easily access specific information from a variety of databases. The system is designed to help Federal and state officials and their contractors involved in site remediation find the information they need. For example, ATTIC can provide currently available technology information to help the user compare technologies. ATTIC contains historical site remediation information to enable users to compare their efforts with previous efforts at similar sites. ATTIC also serves as a link between

users and the EPA research laboratories. Users can currently access ATTIC through a telephone hotline and the database is available in disk version. In the near future, users will also be able to communicate online with ATTIC through their personal computers.

EPA prepares a variety of publications on the SITE Program and its results. SITE brochures that describe the program are prepared twice each year. We have published a document entitled "The Superfund Innovative Technology Evaluation Program: Technology Profiles," EPA/540/5-88/003. This document includes an overview of the SITE program, a list of the program participants, and information on each of the technologies, such as a description, discussion of applicability, the status of the project, and an EPA contact for further information.

As soon as data are available from each demonstration, a Demonstration Bulletin is issued. This is a one-page description highlighting the most important results. Demonstration Reports and Applications Analysis Reports, which I have mentioned already, are also prepared for each demonstration. Six demonstration reports and four applications reports have been completed and are being distributed.

To supplement these materials, EPA has conducted a seminar series on innovative treatment technologies and is planning a regional series this fall on results from the completed SITE demonstrations. We also try to reach people through existing mechanisms. The SITE exhibit booth is displayed at numerous conferences each year. The most recent conference we actively participated in was the International Forum on Innovative Hazardous Waste Treatment Technologies on June 19-22, 1989 in Atlanta, Georgia. SITE industrial developers were chosen as speakers for

the conference. Nearly 500 federal, state and local officials as well as industrial representatives attended. We also try to reach people through technical journals. After each completed demonstration, the SITE project managers prepare an article. Most recently a series of articles were published in the Journal of the Air and Waste Management Association.

EPA has tried several methods for reaching developers who might have promising technologies. EPA holds conferences prior to each solicitation cycle to answer questions from developers. Preproposal conferences were held in Cincinnati, Ohio; San Francisco, California; and Washington, D.C. prior to our third and fourth year solicitations. At these conferences, EPA staff discuss the types of technologies we are seeking, the program requirements, and the benefits that participation in the program offers.

EPA also makes an effort to explain the SITE Program to the public. Fact sheets may be prepared that describe the technology in non-technical terms. These fact sheets are distributed in the community prior to the demonstration. In addition to the required public comment period, the Community Relations Officer for the site is encouraged to hold at least one informational briefing or public meeting in the community to tell the local citizens about the planned demonstration. At some Superfund sites, the citizens have become highly organized and active in the decisions concerning the site. They may be skeptical about a "demonstration" of a new technology and concerned that it may present a risk to their community. Meetings and open houses or Visitors' Days have been held at eight demonstration sites with an average of 75 visitors at each site.

The recent Superfund management report urged ORD to continue, and if necessary expand, our technology transfer activities. We

concur. ATTIC was placed in operation June 7, 1989, well ahead of its original schedule.

CONCLUSION

My final point is an important one. The SITE Program is a unique experiment for EPA. The demonstration projects are true partnerships between EPA and the developers. Each party has a specific role, and both must carry out their responsibilities for the program to work. The developers are responsible for mobilizing and operating their equipment, and EPA is responsible for collecting samples and evaluating the results of the demonstration. As equal partners, EPA and the developers must negotiate a detailed plan for the project -- neither can dictate to the other. This unique feature is the program's strength.

We must depend on the cooperation of the developers for their half of the partnership. We have done everything we can to encourage that cooperation. We have modified the procedures for making their participation easier. We are also considering modifications to our indemnification policy to give us greater flexibility. This meets a need expressed by many developers. However, we cannot order or require a developer to accept a suggested demonstration site or to initiate a demonstration at a particular time. The strength to do this is in our experienced project managers and site selection team.

Since this was a new program there were a number of start-up issues to resolve. The SITE Program's senior managers meet regularly to review these issues and to take whatever steps are necessary to improve the efficiency and the effectiveness of the program. Let me outline some of the steps we have taken.

- A rigid reporting schedule has been implemented to ensure that reports on the outcomes of demonstrations will be

available sooner. Elapsed time for report publication has been reduced by 33%.

- A "fast track" process has been expanded to identify more technologies that are ready for demonstration and have a host site. We will accept proposals from these developers at any time during the year.
- Enforcement of the "exit policy" for demonstrations that have not shown progress has resulted in tighter adherence to the demonstration schedules.
- The time required for site selection has been reduced by 20%.
- Total time for an entire demonstration, from acceptance of the developer to publication of the Reports, has been reduced by 24%. Our goal is to further reduce this time to a total of 18 months.

As I stated in the beginning of my testimony, we are carefully reviewing the recent report "A Management Review of the Superfund Program" and are currently beginning implementation of several of the recommendations including:

- establishment of a technology support team within the Office of Research and Development to provide on-site, project-by-project technical advice to regional project managers on treatment technologies.
- establish a treatability assistance program within the Office of Research and Development to perform treatability tests, develop standard testing protocols, and maintain a data base of test results.
- complete development of our information clearinghouse -- the Alternative Treatment Technology Information Center -- to include a computerized data base that allows access through telephone inquiry, on-line computer access and printed material.

- o establish a fully permitted and licensed test and evaluation center in Edison, New Jersey.
- o ensure rapid, full implementation of our recently established National Environmental Technology Applications Corporation -- a partnership of government, industry and academia -- dedicated to commercialization of new technologies and products.

In summary, I believe we have created through SITE a successful model that can be used in other federal programs. Recently, we have begun discussions with DOD and DOE on the cleanup of radioactive-contaminated sites. We recognize that the program still has some problems and we are working as diligently and rapidly as possible to resolve those problems.

Mr. TORRICELLI. Thank you, Mr. Skinner, Mr. Luftig, I understand you do not have an opening statement, but will respond to questions, is that correct?

Mr. LUFTIG. That's right.

Mr. TORRICELLI. Mr. Scheuer?

Mr. SCHEUER. Thank you, Mr. Chairman. Mr. Skinner, you mentioned that you are reducing your time for writing the reports by 33 percent. Can you give us in actual days, weeks, months, years?

Mr. SKINNER. From the time that the demonstration is completed, to the time the report is printed and available, we are now running about 330 days to do so.

Mr. SCHEUER. So that is about 11 months?

Mr. SKINNER. Eleven months, that is correct.

Mr. SCHEUER. To write the report?

Mr. SKINNER. It is more than just writing the report. The first thing we have to do is analyze the vast amounts of data that are collected at each of these SITE demonstrations. We have to go through the chemical analyses of that and we also have to interpret that data. Once we do that and we draft a report, then that report is reviewed by three people, or three groups of people. It is reviewed by our office, it is reviewed by the developers themselves because they have an interest in the program and they have to have an opportunity to comment on the report, and then it is peer reviewed by independent individuals, who look at this from an outside perspective.

That process takes approximately six months, to get all of that complete. Once that occurs, all of the data from the demonstration is placed into the Automated Data System, so people will have access to it within a six month period. Following that, we prepare the final report, go through the final clearances and finally print the report and the report comes out at the end of an 11 month period.

Mr. SCHEUER. Now, you said from the start, from the selection of the SITE to the final report being issued is about 18 months.

Mr. SKINNER. That is our goal. We are running above that right now.

Mr. SCHEUER. I see. Well, just as an observation, this whole process is not to present the definitive research evaluation of each of these technologies, is it not more or less, and we have the author of it here, to sort of get the word out in the stream of commerce to the developers, the government agencies, about which technologies look like promising technologies? And if that is that main purpose, then would it not be worthwhile to save time, perhaps at the expense of the final fraction of a percentage of realizability and accuracy, since this is a rough, is it not a rough rule of thumb to let the world involved in toxic waste recycling and so forth, to let that world of scientists, developers, government people know that there is a really promising technology that is being developed here and they ought to have a good hard look at it?

Mr. SKINNER. I think getting the word out on the promising technologies is an important part of the program, but the key to the program is getting reliable data, both on the performance and on the cost of the technology so that when regional project managers have to make decisions, and there are decisions involving millions

and millions of dollars at a SITE, that they are comfortable with the data that they have and they feel they are making a sound decision.

So, we do place a lot of emphasis on high quality data and peer review data and data that has gone through quality control and quality assurance. I think spending time at that part of the program will reduce time in the future, when people have to make decisions.

Mr. SCHEUER. Then I have another suggestion. If you have that 18 months or 20 months period, someplace considerably before that, I think you would have a clue that you got a pretty promising technology here. When would that begin to evidence itself?

Mr. SKINNER. That would be six months after the demonstration is completed, when we have the data from——

Mr. SCHEUER. That would be what time in this?

Mr. SKINNER. Approximately a year.

Mr. SCHEUER. One year. Would it be possible then, just to send out an advisory, where you have a promising technology, just alerting people to the fact that in six to eight to ten months, you will have some definitive evaluations, but right now they should stop, look and listen and have the knowledge that a promising technology is about to be fully validated and they should not make important decisions on alternative technologies for a particular development site, until they give some thought as to whether this would be appropriate and they would probably have knowledge of that in another six or eight months?

Let me ask one other question. You've developed quite a promising system here, as a government system for evaluating alternative technologies and the promise of new technologies that are being developed. Would this be appropriate, not only for toxic waste, but also for air pollution and water pollution and new technologies that are being addressed to tackle those problems?

Mr. SKINNER. Yes Congressman, sure. I think it is an excellent model. I think it can apply to many other types of technologies, municipal waste technologies, I think it could apply to air pollution technologies. I think the relationships——

Mr. SCHEUER. Water pollution?

Mr. SKINNER. Water pollution, the full range. I think the relationship between EPA and the private sector is appropriate and I think it is applicable across the board. We have begun to use similar approaches with respect to municipal wastes, and also with respect to waste reduction type of technologies.

Mr. SCHEUER. Thank you very much, Mr. Chairman.

Mr. TORRICELLI. Thank you, Mr. Scheuer. Mr. Skinner, the series of questions, if I could, then. The 140 technologies that you have cited that have come forward at this point, have any of those involved the department actually hearing about a technology, stumbling upon a technology being used nationally or internationally and requesting it to be evaluated, or are these all based on requests coming the other way, from the inventor or company?

Mr. SKINNER. Most of them have been as a result of the inventory applying in response to our announcement that we publish on a——

Mr. TORRICELLI. Are there, however, instances when the department has heard——

Mr. SKINNER. Yes, there are.

Mr. TORRICELLI [continuing]. About innovative technology and has sought information?

Mr. SKINNER. Yes, yes there have been. When we hear about technologies and they are very close to having a site selected, we will actively go out and try to bring them into the program.

Mr. TORRICELLI. Does that include any of 10 that have been selected——

Mr. SKINNER. Yes it does.

Mr. TORRICELLI [continuing]. Successfully tested at this point?

Mr. SKINNER. Yes it does.

Mr. TORRICELLI. Does that involve both from corporations and from universities?

Mr. SKINNER. I think most of them to date have been all corporations. I would have to go back over the list to see whether there were any universities involved. But universities certainly could apply to the program if they could meet the requirements with respect to the status of the technology.

Mr. TORRICELLI. Of the 140 that have come forward at this point, how many of those have been actually used by governments in Western Europe, Japan or elsewhere in the world in their own programs, approximately?

Mr. SKINNER. I don't have a statistic on that. Many of them have pilot plant data, some of them have been used in Europe. We have an active program of information exchange with various organizations, international organizations. I would have to go back and get that information for you.

Mr. TORRICELLI. Well, help me then just to understand whether there remains a significant gap as there was in 1986, which in part is what convinced this committee to act, that there was a significant body of scientific knowledge available for innovative technologies that were being used in the rest of the developed world, that were not being used in the United States. Is that gap closed?

Mr. SKINNER. I think that——

Mr. TORRICELLI. Does it still exist to some extent as evidenced by some of these 140 technologies being used in Japan and Europe that have not yet been tested here, or have been tested and rejected?

Mr. SKINNER. I think we are closing that gap. All of the information that we are obtaining from Western Europe, from Japan, from contractors' independent evaluations of their technologies, will be placed and is being placed in the ATTIC information system. So, we are assembling information from every source available, including that from Western Europe. I think that the rate of use of those technologies in the United States is still lagging behind other countries. And I think over the next several years, you will see us catching up.

Mr. TORRICELLI. Now, does that remain because of difficulties of incineration licensing and cost availability of land filling? Those were the reasons that were largely explained to us in 1986. Are those the principle reasons why the gap remains?

Mr. SKINNER. I think the permitting delays is still a significant issue. I think the costs of the technologies are becoming much more competitive with——

Mr. TORRICELLI. Permitting delays, which way? Because of incineration, because of air, or because of the sites for land fills?

Mr. SKINNER. Permitting of any type for either incinerators with respect to air and other discharges, the permitting of treatment technologies, all result in a significant delay in getting the technologies to be actually used. Now within the SITE Program, since we operated Superfund sites and have an exemption from the permitting requirements, it is not an issue, but it is an issue with respect to technologies on a nation wide basis. All right, Mr. Luftig might be able to add to that.

Mr. TORRICELLI. Yes, at any point, Mr. Luftig, please respond to any question.

Mr. LUFTIG. I could just add a couple of points. Some of the SITE demonstrations have used transportable technologies and that has been to their benefit in gaining community acceptance at Superfund sites. You don't need permits if you are at a national priorities list site, but you also need to involve the public. And by using transportable units, the public perceives that it is not going to be there forever, it is going to treat the waste and leave, and that has been an asset.

Mr. TORRICELLI. Why the continuing complaints that people who have good technologies and want to seek approval cannot have samples made available to them from Superfund sites? There is probably no other complaint that is so universal about the program.

Mr. SKINNER. I did not realize there was a problem in obtaining samples from the sites. I thought the problem was that even when they obtained those samples, they would require a permit in order to process those samples. And that is an issue of——

Mr. TORRICELLI. That too. But it is my understanding and I think we may hear later, that there are also people who are claiming that they would like to test their technologies against problems at specific Superfund sites, but do not always have access to the materials to do so. How do your procedures work that way? If someone comes forward and indicates that they have a good technology for a given environmental problem, that they would like a chance to test it, how are samples made available?

Mr. SKINNER. If they are part of the SITE Program, we can establish a treatability test at any part of the program, where we could make those samples available to them. I think in general, unless there are safety issues or other type of issues, if anyone requested a sample from a Superfund site, we would make it readily available. Mr. Luftig?

Mr. LUFTIG. I think we have lots of samples and lots of sites. I don't think there would be an obstacle there, so——

Mr. TORRICELLI. So you think the only part of this problem then is permitting to do the tests?

Mr. SKINNER. I think that is a more significant problem, yes.

Mr. TORRICELLI. Why in your judgment something that was not foreseen, which is that people would with these new technologies, would be going directly to project managers, circumventing the

process that we have tried to establish? It appears to be happening overwhelmingly, why?

Mr. SKINNER. I think that the level of action, with respect to the Superfund Program, where they have close to 1,000 active projects and decisions are being made on many of those projects right today, in those instances where the SITE demonstrations of those technologies have not been completed, the only option for using that technology at a Superfund site would be then go directly to the regional project manager. We then work with the regional project manager and try and have them obtain, outside of the SITE Program, whatever data is available on the technology and help them interpret that. And I think it is partially due to the early delays in the program and the fact that we did not get sites selected as fast as we should have in the early years.

Mr. TORRICELLI. They've lost confidence because of the initial time delays?

Mr. SKINNER. I believe that there have been delays that have——

Mr. TORRICELLI. How about the costs? I know you are dealing with very different technologies in very different sites, maybe there is not a rule of thumb, but if you had to cite what would appear to be a approximate example, what kind of cost tends to be involved in someone coming forward, bringing their technology through the process, getting to their actual report stage?

Mr. SKINNER. The cost to the private developer involves assembling his technology at the site, operating it for the period of the demonstration and then removing it at the end. We do all of the analyses of the samples and then, we actually take the samples. The cost to the developer could be $1 million, $2 million in order to do that. And that, in some instances, probably is too great of a cost for them to bear.

The important point is that that is the only way that you can get full scale reliable information. If you deal with pilot plan information, if you deal with information from the laboratory scale, there is always major uncertainty in taking those projects to the full scale. I think the SITE developers, as a group, have agreed that making that investment is important so that their technologies will be used in the future.

Mr. TORRICELLI. Well, we are dealing with a scale of costs and outlays that in the 10 that you have seen successfully completed so far, can reach into the millions for the private contractor?

Mr. SKINNER. Yes, that's right, yes sir.

Mr. TORRICELLI. Most enter into the process understanding the financial exposure?

Mr. SKINNER. Yes.

Mr. TORRICELLI. I have a series of questions, so I am going to jump around a little bit. But I want to accomplish a few things in the time we have together. Of the 10 successful evaluations so far, how do they—what is their potential against the top 500 or 800 sites in the country? What I want to get at is how SITE specific are these technologies with a very broad national problem?

Mr. SKINNER. Let me talk about just a few of them, since I cannot go through all of the 10 and I will use the two that are going to appear here to testify later today. The vacuum extraction technology: we think the results were very promising in terms

costs, it was very low cost. It resulted in low levels of contaminates being left after the vacuum extraction was completed. I understand a number sites are interested in vacuum extraction, both with this developer and other developers. I think that technology will be widely used. I cannot give you a number, but it will be used many many times.

Mr. TORRICELLI. I guess my point is, are many of these technologies site specific, or are some, at least some of the 10 such that you could conceivably say this has a potential at 50 sites, or at 100 sites, or are they very site specific based on a composition of the contaminants of that one location?

Mr. SKINNER. One of the things we do in our applications analyses reports, is talk about applicability to other sites. And I think all of these technologies will be applicable to many of the sites.

Mr. TORRICELLI. Have multiple applications.

Mr. SKINNER. Let me just comment on the other technology that you are going to hear about this morning, which is the solidification type of technology. That is going to be widely used at Superfund sites. Not only the particular technology that was in the SITE Program, but various forms of solidification and stabilization is being used and the fact that we are starting to get data on this out of the SITE Program, should be very very helpful to the selectors. Steve did you want to comment?

Mr. LUFTIG. Just a note on that. You know, if you look at the sites on the national priorities list, the vast majority are there because of ground water problems. And many of the technologies being looked at are ground water treatment technologies. And for the most part, they are addressing the organic contaminants in ground water, which we have so much of in New Jersey.

The other larger number of sites have soil contamination. Again, mostly with organic contaminants and the site technologies are looking at those. So I think they will be applicable to hundreds of sites on the national list.

Mr. TORRICELLI. And one of the difficulties that also led to this law, was information from developers of these technologies. There was an inability to bid, because while they were offering long term solutions, they were invariably more expensive than short term alternatives. In the current, in the Superfund Program today, a possible new technology and long term answer is the seeking a contract against incineration or disposal site technology, has that playing field been leveled?

Mr. LUFTIG. I think if you look at the recent remedies we have selected, at least speaking for Region II, you will see that we have used cost as one of only nine criteria and one of equal weight with the other eight. It is no longer true that if you can cap it and leave it there, that is what we do and walk away. I would point toward a remedy we selected earlier this fiscal year in Toms River, New Jersey, where we selected a remedy that will pump and treat contaminated ground water and treat it to very pristine levels. We estimate the cost of that to be on the order of $160 million. Treatment is very expensive, but it is permanent. And when you look at the cost of it, you have got to compare it to a cost of practically eternal maintenance of leaving the stuff on site.

We have a site in upstate New York where we are working toward a remedy. It is on the St. Lawrence River and the affected community is the St. Regis Mohawk Indian Tribe. And they have added a tenth criteria to our consideration, that one needs to look at the next seven generations to determine whether the remedy you are going to select is going to be effective. So there too, we are faced with encapsulation versus treatment.

Mr. TORRICELLI. So you feel that we have now reached a real balance——

Mr. LUFTIG. Yes.

Mr. TORRICELLI [continuing]. Where cost is an appropriate, legitimate factor, but that it is balanced against long term, a long term maintenance problem?

Mr. LUFTIG. That is very true.

Mr. TORRICELLI. Is there a phase at which when there are a variety of these new technologies out in the marketplace and private companies come forward, not on a Superfund site, but nevertheless with environmental problems, where the EPA will actually be selecting, making its own judgments about what is and is not appropriate and preferable and specifying that technology?

Mr. LUFTIG. I think right now, as John said——

Mr. TORRICELLI. Can everybody hear by the way? Is it all right?

Mr. LUFTIG. If you are a project manager in the regional office, you are one of the 100 or so project managers, you get a lot of literature from the private sector and solicitations from treatment technology developers and vendors. You also though, have now quite a battery of literature put out by EPA, which tends to be, if not more objective, it tends to use more quality assured data. And I think our project managers are now able to weigh a great deal of information in making selections, or making recommendations to the regional administrator on what type of remedies to select. I think if you are in the field, you do have input into what we are going to select. And project managers have a good library of literature to look at.

Mr. TORRICELLI. Opportunities for project managers for your own field representatives to know about these findings as well, they are in the literature of the department, no doubt, I assume there are some in the professional journals and literature that are circulated as well. Are the results also shared in any other direct ways, project managers brought together from around the country, field people for EPA brought together from around the country, where this data is reviewed?

Mr. SKINNER. Yes, there are seminar series on alternative technologies that we hold at the regional offices and meet with the regional project offices and go through the technologies. For the 10 completed demonstrations, we are going to have a series in the next year. We are going to ask each region which ones they would be interested in having a particular seminar on. We will carry the information forward in those briefings. And we also have the clearing house that we have developed, which is the automated phone access, soon to be a PC access clearing house.

Mr. TORRICELLI. As a result of all these things, in your judgment are we past then what we perceived in 1986, to be an anti-technology, anti-new answer bias, both in the industry and in field repre-

sentatives of the EPA? You may not share that, if that perception was accurate in 1986, but that was ours. Are we past there being such a bias?

Mr. LUFTIG. Certainly in Region II, again I think if you look at containment versus a permanent remedy, we are looking at cost as one of only nine criteria. And it is not the overweighing, the overwhelming factor anymore. I think we are more and more selecting treatment and permanent destruction, as the law requires us to do. It is true in well over 50 percent of the remedies we have selected in the region.

And just to add a thought to John's previous response, we have also had seminars in the regional office, not on a national scale, where the Hazardous Waste Treatment Council has come to the office to brief our project managers on a range of technologies that their folks were developing.

Mr. TORRICELLI. Let me ask for a moment about mobile systems, of which we have seen a great number, I guess many, though not all of the solidification process at one kind or another. Are we going to reach the point where a mobile solidification process has gained approval in your testing and in the marketing of that technology they can go to people and claim that they are carrying in their pocket some form of blanket approvals, so that as part of their marketing there would-be clients know that they have this advantage of speed, of approvals and dealing with a given range of contaminants, that they will not start as a new SITE every time they arrive at a job?

Mr. SKINNER. Let me address that in two, from two points of view. One from a technology point of view, the applications analyses report that we would put out on a particular technology, would discuss the applicability of that technology to wide ranges of wastes. And so, we would make a projection and for those ranges of waste and for the limitations described in the report, they could say that EPA says that this technology is useful on these wastes under these conditions. And that would be something that they could say and we would stand behind them in regard to that.

The second part is the actual site-by-site approval, whether they would require a permit for their technology on a site-by-site basis. And except for Superfund sites where there is not a requirement for a permit, the way the law is written today, you would require permits on a site-by-site basis. So they would have to go through——

Mr. TORRICELLI. That would require a change in the law.

Mr. SKINNER. That would require a change in the Resource Conservation Recovery Act.

Mr. TORRICELLI. Is that advisable in your judgment?

Mr. SKINNER. Let me make two comments. One is there is a similar set of provisions under TSCA, which allows area wide permits, where someone can get a permit for an entire state, perhaps even for a different——

Mr. TORRICELLI. So they could so—someone marketing the State of New Jersey could say I have got an EPA permit to deal with the following contaminates anywhere in this geographic area, hire me tomorrow, I can start work the next day, nothing required?

Mr. SKINNER. There may be a public notice required, just to give people advance notice.

Mr. TORRICELLI. But otherwise——

Mr. SKINNER. And that is the way it works under TSCA, for PCB wastes. I think that is a approach which really stimulates the use of alternative technologies and cuts way down on the procedural delays.

Mr. TORRICELLI. Dramatically, it would take the lid off private companies being able to contract.

Mr. SKINNER. That is correct.

Mr. TORRICELLI. So why not do it?

Mr. SKINNER. You would have to change the law——

Mr. TORRICELLI. Yes, but——

Mr. SKINNER [continuing.] In order to do it.

Mr. TORRICELLI. I am asking your advice on whether the law should be changed, it's one of the reasons for the hearing. Should the law be changed?

Mr. SKINNER. I think from my perspective, which is to stimulate innovative technologies, I think that would be a useful change in the law. Citizens may be concerned about the lack of opportunity that they would get with respect to testifying on a site-by-site basis, with respect to use of these technologies, and that is the balance that you would have to strike.

The other comment that I——

Mr. TORRICELLI. Of course you could set up a process where the permit is granted, but a hearing required, but where the burden has shifted the other way.

Mr. SKINNER. That's correct.

Mr. TORRICELLI. People can come forward to prove that in fact this technology is not applicable to these wastes.

Mr. SKINNER. There would be a lot of ways in which you could cut corners and to reduce the time. The other point that is important though, is that the same change in the law would have to occur at the state level. Because right now, the states have followed the federal approach in many instances and require a hearing on a site-by- site basis. So even if we change the federal law, until the states change their laws in the same way, you would still have the same problem.

Mr. TORRICELLI. Potentially you could have a federal preempting permit, could you? It may not be advisable, but I still——

Mr. SKINNER. I think that would also require a legislation change.

Mr. TORRICELLI. But in any case, such a mobile permit, in your mind, could be done with a change of the law and might be advisable, but for the state problem——

Mr. SKINNER. That is correct.

Mr. TORRICELLI [continuing]. As well? Are there other changes in the law, in your judgment, which at this point, three years into the program, would make sense from our perspective in cutting the time, making this operate faster or better, or are you content with how we have now established the law?

Mr. SKINNER. I think from a legislative authority point of view except for the issue that we have just discussed, the law is adequate—I think it's a matter of us improving our internal proc

dures, within the confines of the law and I think we are capable of doing that.

Mr. TORRICELLI. Then how about, I understand you have over $19 million approximately scheduled for this——

Mr. SKINNER. $19 million a year for the last two years.

Mr. TORRICELLI. Is that adequate for the review of the technologies?

Mr. SKINNER. Yes, in terms of the number that we are getting into the program, we are able to manage those at that level. That is a statutory limitation as well.

Mr. TORRICELLI. Given the technical abilities in the field that you have witnessed in industry and universities around the country, could a great deal more be done in developing additional technologies, if there was an increase in research funds made available to universities, or is that research being done at as much of a pace as the talent can now handle?

Mr. SKINNER. I think that again outside of the SITE Program and the SITE Program has a $20 million dollar legislative cap, I think there could be a lot done technologically in the hazardous waste area by providing some additional funding to facilities that are at the pilot plant level, facilities that are at the laboratory level. So I think we could fill the pipeline so to speak, in order to develop technologies further along——

Mr. TORRICELLI. So if we were to have legislation to take this to a second phase now with the SITE Program, would you additionally have, the SITE Program have its own funding for university, private corporation grants, where you would research, you may discover an idea or someone may have developed a technology which is not prepared to be tested, but which you think has real merit and you would like to see advanced?

Mr. SKINNER. You could do that outside of the SITE Program and that would have a lot of merit.

Mr. TORRICELLI. Outside of the SITE Program?

Mr. SKINNER. Yes.

Mr. TORRICELLI. But you don't think it is a natural compliment to the SITE Program itself?

Mr. SKINNER. What I am saying is that all of the procedures that have been set up under the statute for the SITE Program and the limitations on funding for the SITE Program, need not be followed. I think we could operate something in parallel outside of the specific provisions of that part of the legislation and accomplish the same thing.

Mr. TORRICELLI. Now this fact that you have attested 10, you say you have another nine you are going to do in the next year in a universe of 140, the enormous number of these technologies, is that because we are dealing off of a backlog, because we were not paying attention in those three years, or is there actually, are there actually technologies being developed at that pace? In other words, are we going to plateau here soon and you are going to do 10 a year for 10 years, and we are going to pretty much have done it, or are you finding every year that there is an additional five or 10 new approaches coming forward?

Mr. SKINNER. Again, just based upon our three year history, we see them coming in at approximately 10 a year. And those are 10

projects that meet the criteria that we feel are acceptable and we should proceed with the demonstration. And I don't see any stop in that. I think it is going to continue at the same level for the next several years at least.

Mr. TORRICELLI. Private industry or university generated?

Mr. SKINNER. Mostly all industry generated.

Mr. TORRICELLI. Industry generated?

Mr. SKINNER. Yes.

Mr. TORRICELLI. And to what extent foreign based versus American based?

Mr. SKINNER. I think they are all U.S. based or licensees of technologies that have been used in Europe. I don't think we have any non-U.S. corporations in the——

Mr. TORRICELLI. But technology is generated abroad, licensed by U. S. companies?

Mr. SKINNER. In some instances, yes. I would have to go back and look it over to find out——

Mr. TORRICELLI. They tend to come from large corporations or small?

Mr. SKINNER. It is a mix, but there is quite a bit of individual entrepreneurs, small companies in the program.

Mr. TORRICELLI. I just for a moment, would like to run down a few of the new technologies and get from you a sense of where you have great hopes, the breadth of application that you see possible, just by citing some categories and you tell me where you think there is some progress made and some real possibilities for the future. Oxygen burners?

Mr. SKINNER. Yes, that was one of the demonstrations and it was very successful in showing that you could destroy waste at very high temperatures, very completely and I think oxygen burners will be used in more and more incineration projects.

Mr. LUFTIG. I could point out that at the Bridgeport Lagoon in Southern New Jersey, which is an NPL site, the contract was recently awarded for the remedy to incinerate the lagoon to a firm that is going to use an enhanced oxygen incinerator. So that is picking up on that demonstrative technology.

Mr. TORRICELLI. And the actual unit is now being marketed by someone, or are you testing it?

Mr. SKINNER. We have completed the demonstration on that. The company does market it for incinerators——

Mr. TORRICELLI. As turnkey unit?

Mr. SKINNER. It is actually, it is a burner which fits into an incinerator.

Mr. TORRICELLI. I see.

Mr. SKINNER. What they market is the burner itself.

Mr. TORRICELLI. Infrared incinerators?

Mr. SKINNER. Infrared incineration, we have demonstrated that at two sites. We have found the costs were competitive with other types of treatment and the destruction efficiencies were very good as well, so we will see that applicable elsewhere. I understand, I believe the number is three companies have purchased infrared incinerators and are bidding these at various sites around the country.

Mr. TORRICELLI. What is the advantage of using infrared?

Mr. SKINNER. It is in terms of the air flow through the incinerator, it is lower, so therefore the air pollution control equipment is smaller. They are able to reach the temperatures that they need for destruction. It is a portable unit, which can be mounted on a truck and hauled onto the site.

Mr. TORRICELLI. In-situ volatilization?

Mr. SKINNER. In-situ volatilization, I presume we are talking about vacuum extraction?

Mr. TORRICELLI. Yes.

Mr. SKINNER. Yes, very——

Mr. TORRICELLI. I don't understand how it works——

Mr. SKINNER. Yes, basically you place wells into, above the water table and you extract the organics, the organic materials that are in the soils and in-situ, without having to dig up the soils, you need to burn them or treat them. Very promising.

Mr. TORRICELLI. By simple suction?

Mr. SKINNER. Pardon?

Mr. TORRICELLI. By simple suction?

Mr. SKINNER. By simple vacuum, yes, yes. Very promising technology. Low costs, can do it in a way that does not significantly disturb the site or have to extract the wastes. It really depends though on the type of wastes that are in the site. They have to be something that can be removed through vacuum extraction.

Mr. TORRICELLI. This being used?

Mr. SKINNER. It is being used in a number of instances, yes.

Mr. LUFTIG. We are about to select a remedy at a site on Long Island called SMS Instruments. We are about to propose a remedy rather, and go public with one that would in situ inject steam and air and strip out the volatile organics from the soil, which was another SITE demonstration.

Mr. TORRICELLI. Now tell me how that works? You have gone to a site, you have seen a problem, they are looking for answers, they may come up with answer X. They want to do X. You are then coming back and saying, we have got a better idea.

Mr. LUFTIG. Well, in this case the responsible party did not have the funding to do the study. So Superfund monies were used for EPA to conduct the study and——

Mr. TORRICELLI. So you came up with the only idea?

Mr. LUFTIG. We came up with a variety of possibilities. One of which seemed to match the contaminants of the soils here, the volatile organics, with a type that John demonstrated when he looked at a Toxic Treatments, Inc., steam stripping/air stripping unit. So we are going to try it. Propose to try it.

Mr. TORRICELLI. Now your report then might indicate that you like the application of this technology to that site?

Mr. LUFTIG. Right.

Mr. TORRICELLI. There might be more than one company that uses this technology, potentially.

Mr. LUFTIG. Right.

Mr. TORRICELLI. Are you deciding the company or are you deciding the technology?

Mr. LUFTIG. In fact, we are trying to be as flexible as possible when we make these records of decision for Superfund sites. I think that what we would select here would be an in-situ enhanced

volatilization using steam and air. So that when we do fund the construction, if that is the remedy we select, there would be an opportunity for several bidders to go forward with it.

Mr. TORRICELLI. Vitrification?

Mr. SKINNER. Vitrification is a technology which we have not yet demonstrated. There has been some testing of this done at a smaller scale. We think it has potential in a number of areas. One would be potentially radioactive waste sites and we are actively working with the Department of Energy to come up with a demonstration in that area. I think we have to wait until we see the results of a full scale demonstration before we can project.

Mr. TORRICELLI. This, in layman's terms is simply passing an electrode through the material?

Mr. SKINNER. That is correct.

Mr. TORRICELLI. Transforming it into a gas?

Mr. SKINNER. It basically melts the soil into a solidified glasseous melt. It also does release some of the organics and that is collected in a hood and then treated.

Mr. TORRICELLI. How does that release radioactivity?

Mr. SKINNER. It does not, it contains it in the solidified mass.

Mr. TORRICELLI. Oh, I see. Pyroplasma?

Mr. SKINNER. Starting, getting beyond my list of readily available technologies in front of me. Pyroplasma is a technology which has been demonstrated, I believe, only at the small scale and has not been demonstrated on a large scale yet.

Mr. TORRICELLI. Is it in the next group of 10?

Mr. SKINNER. It is in our projects, it is not in the next group of 10, from what I understand. We just, no it is not.

Mr. TORRICELLI. Now, encapsulation, I know we all probably had the most experience with. Just talk for a minute about encapsulation. Is it the most marketable at the moment, how wide is its reach, does it have a future, or does it have a future until there are other technologies? Give me your general sense of it. I know there are a number of companies competing in the field.

Mr. SKINNER. Yes. Encapsulation is also called by many other names such as solidification and stabilization and fixation. And there are a number of many many companies in the field, as you just said. It is clearly applicable to inorganic wastes and metals. It is very very effective on metals. We have also demonstrated that it can be done in-situ, where you do not have to extract the waste, where you can place drills in and feed into the soil itself the stabilizing medium, so we can do it in-situ, without having to put it in a reactor.

The key question on stabilization is what does it do to organics, can it stabilize organics and what do organics themselves do to the stabilized mass? Does the mass stay stable? In answer to the second question, we found that more and more stabilization technologies can accept the organic material and still remain stable from a physical point of view. Earlier technology used to break down when you got to high levels of organics. We have not found a stabilization technology which can successfully chemically tie up the organics. It seems to be more of a physical bonding of the organics or a very light weak chemical bind.

Mr. TORRICELLI. But yet you state there are large sites that are inorganic that have not found a remedy and these solidification processes would appear applicable.

Mr. SKINNER. I think they would, yes.

Mr. TORRICELLI. What is the problem?

Mr. LUFTIG. We are going to be trying one shortly. We have selected that for the Chemical Control Site in Elizabeth, where after the fire and we have removed the drums and cylinders, what remains is a contaminated soil, which we hope to solidify to a point where one day a small building might be built on it. It has a mixture of chemicals in the soil and we will see how it works. We are doing, we have just contracted for the treatability studies. We have selected it also at a site in upstate New York, in a rural area in Elmira, New York, called York Oil, another solidification remedy and we will see how it works.

Mr. TORRICELLI. What is the principle competition for the solidification technologies? Who were they vying against, what process?

Mr. SKINNER. It would really depend upon a site-by-site analysis, possibly, well, for dealing with the metal some sort of chemical treatment to either extract the metals or to tie up the metals chemically.

Mr. TORRICELLI. So anyone now with solidification process was out in the market and they are visiting a project manager and comparing costs, that is what they are hearing as the alternative?

Mr. SKINNER. I think so, yes.

Mr. TORRICELLI. Similar costs?

Mr. SKINNER. I would have to go back and check.

Mr. TORRICELLI. Finally, chemical decontamination?

Mr. SKINNER. Yes, we have had a number of successful experiments with chemical decontamination and this can be used both as a separation technology, as a final treatment technology and I think that has a place in the market place as well, depending upon the wastes.

Mr. TORRICELLI. The attempt at sea incineration that failed so miserably in our country, was that an oxygen burning?

Mr. SKINNER. No it was not.

Mr. TORRICELLI. How did they achieve the levels of burning?

Mr. SKINNER. I presume it was just a straight fuel——

Mr. TORRICELLI. The fuel incinerator just happened to be on the ship?

Mr. SKINNER [continuing]. Or standard incinerator, yes it was a standard incinerator mounted on a ship.

Mr. TORRICELLI. Your only recommendation then for the committee at this point to change the current law is the possibility of a mobile permit, otherwise you are content with the law as it is written and its funding, though outside the SITE Program, just to summarize our conversation, research funding for small companies or universities, you do think might hold some promise for technologies not fully developed.

Mr. SKINNER. That is correct.

Mr. TORRICELLI. But those are your only two suggestions at this point?

Mr. SKINNER. Yes sir, with respect to legislation.

Mr. TORRICELLI. Any closing comments you would like to make?

Mr. SKINNER. I hope we hold another hearing in the future, Congressman Torricelli, and that we can come back and report on future progress made in the program. It is a very high priority in EPA and we appreciate your support.

Mr. TORRICELLI. Thank you very much, thank you both for coming.

Our second panel, if you would please, Ed Putnam, New Jersey Department of Environmental Protection; Dr. John Liskowitz, Institute for Hazardous and Toxic Waste Management, Professor of Engineering, New Jersey Department of Environmental Protection. Please come forward.

Mr. LISKOWITZ. Just a point of record, it is New Jersey Institute of Technology, not Department of Environmental Protection.

Mr. TORRICELLI. These Washingtonians.

Mr. LISKOWITZ. This is the Department of Environmental Protection.

Mr. TORRICELLI [continuing]. Don't know of our wonderful New Jersey Institute of Technology.

Mr. LISKOWITZ. Congressman, this is Dan Watts, who is my associate. He is the Associate Director of the National Science Foundation, Industry University Cooperative Research Center. And he has been working very closely with me in our——

Mr. TORRICELLI. Welcome, we are glad to have you.

Mr. WATTS. Thank you.

Mr. TORRICELLI. Do any of you have an opening statement you would like to make?

Mr. PUTNAM. I have a prepared statement, it is very short, so I would just read from it.

Mr. TORRICELLI. Please make an opening statement. It will in its entirety be in the record, so feel free to cite from it as you like.

Mr. PUTNAM. Okay.

Mr. TORRICELLI. Proceed.

STATEMENT OF ED PUTNAM, NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Mr. PUTNAM. Thank you, Mr. Chairman for inviting us here. My name is Ed Putnam, I am the Assistant Director for Remedial Planning and Design for the publicly funded clean up program in the New Jersey Department of Environmental Protection. We appreciate the opportunity to come here and discuss the SITE Program with you.

I think from New Jersey's prospective, it has been our observation that the SITE Program is working, however, we do want more from it. We have five recommendations we would like to present here today, some of which have already been touched on and I will briefly go through them.

Concerning the technology identification, I think one of our major concerns is that the SITE Program identifies a site for a technology. New Jersey would like to kind of turn that around and identify a site and have the SITE Program find us the technology that seems to work.

We have also found that a lot of our waste at these sites contains several different chemicals mixed together. And the technologies

currently being evaluated, except for the incineration technologies and the solidification technologies, tend to be a certain class of chemical specific treatment. What we are looking for is demonstrations that would involve a treatment train of various technologies that could be used at a particular site.

We would also like to see side-by-side comparisons of similar technologies to enable us to differentiate between the groups of technologies.

Another recommendation we have, in the permitting which was touched upon, New Jersey would support area-wide permitting of these technologies. Of the transportable technologies if they, basically getting a state wide permit and then site-by-site smaller evaluations. They would still need some kind of site-by-site acceptance from the government agencies, however, a statewide type program would help us along.

Mr. Skinner was correct, the State of New Jersey pretty much lags about a year behind the federal government in its changes to its laws; if a change was to be made to the Resource Conservation Recovery Act, it takes New Jersey about a year to make the similar changes. So there would be some lag to that.

An example of this is the treatability study sample shipment exemption that EPA recently came out with; it is going to take New Jersey sometime to implement that. That is causing us a hinderance in getting samples out to people with their technologies, however, we are working on correcting that.

Another recommendation we would have along the lines of funding, and it kind of leads into the fourth one too. There is, it does present a great burden to these companies to try to test their technologies on these sites. A recommendation New Jersey would have would be to possibly have the government fund the demonstration project more, rather than just doing the monitoring and testing. This would reduce the financial burden on the companies.

Another suggestion might be to have the company "be guaranteed of a job" if they are successful. This presents problems in that it is basically sole source procurement on the part of the government and sole source procurement is not how the government likes to do work. The procurement aspect of these technologies is that we have trouble bidding them. You may evaluate a specific company's technology, but you cannot necessarily bid a specific company's technology without essentially awarding a sole source contract.

We really have nothing against sole source procurement, since the technology works, but from a general mind sent, the government is not—is into open competitive bidding. An acceptance on the part of everyone involved on sole source procurement may simply be all that is necessary though. The legislation is there to allow it, it is just that everyone is reluctant to do it.

Also from the industry themselves, if we bid very specific technologies, I think we have to ask them not to protest the awards once they are made. We do have problems in that when we bid a very specific area, somebody else would always like to propose an alternate method.

I think our last recommendation—we have gotten some feedback from private parties who are accomplishing clean up. The feedback

we have gotten is they are reluctant to take on an innovative treatment, in case it does not work on their site, the government is going to turn around and ask them to do it all over again.

I think there may be some recognition on the part of the governmental agencies that specific clean up standards that may be set under the Superfund Program, if the technology gets close enough that we are still within the range of protective of human health and environment, that that may be good enough, even though we have not attained the actual clean up standards. As a regulatory agency, we are kind of making this recommendation from a very cautious standpoint. We do not like to back off our clean up standards in the least, however, if we are looking toward permanent remedies, I think we would be willing to take a second look at that.

I think, to reiterate, New Jersey supports the SITE Program and what they are doing. We would like them to do more, we would like them to involve the states in the program also.

Thank you for this conference.

[The prepared statement of Mr. Putnam follows:]

New Jersey Department of Environmental Protection

Hazardous Waste Management Programs

Subject: Superfund Innovative Technology Evaluation Program (SITE)

Prepared for: The Natural Resources and Environment Subcommittee of the Committee on Science and Technology

Mr. Chairman and Members of the Subcommittee:

Good morning! My name is Ed Putnam.

My position with New Jersey Department of Environmental Protection is Assistant Director for Remedial Planning and Design in the Hazardous Waste Management Programs. New Jersey appreciates the opportunity to discuss the SITE program with you today.

The purpose of the SITE program is to assist private enterprise in developing the commercial viability of cleanup technologies to be utilized at Superfund sites. It should be stated that the program is working, although New Jersey feels that more has to be done. It has been our observation that in setting up the program, the needs have been much greater than the program's capacity, making progress appear slower than our collective expectations. We expected too much of the program.

If the SITE program is to advance, New Jersey respectfully suggests that five issues be addressed.

1. Technology Identification

Superfund sites have cleanup problems unique to each site. As one method of treatment often is not sufficient, we may need a combination of technologies that can have "synergistic" effects. More diversification, more flexibility, as well as state input in technology determinations are recommended.

At the present time, states have little say in determining the technologies to be used. So we are not getting what we need. New Jersey would like more input in recommending new technologies for specific sites. We would like to propose a site and the technology - not find a site for a technology. The determination of what technology is to be evaluated seems to be based on what is already available, as opposed to what is needed. For example, New Jersey needs more demonstrations of the application of combinations of technologies. Our cleanup wastes consists of a witches' brew - halogenated organic compounds mixed with petroleum waste contaminated with heavy metals. Individual treatment technologies must be evaluated in combination in order to address these wastes.

We would also like to see side by side demonstrations of the application of various thermal treatment technologies which achieve similar end products but through various processes. We need more flexibility, not necessarily one site, one technology.

2. Permitting

Although research/demonstration permits exist, environmental laws should be reviewed to be made more amenable to demonstration technology permits. In addition, once the technology is tested and proven, then a general state wide or national permit should be allowed to be issued rather than site by site permitting. A general permit would help make the technology more commercially marketable, since the expensive permit process for every individual site would be substantially reduced. The reduced cost would make new treatment technologies more economically competitive.

3. Funding

The financial incentives in the SITE program seem insufficient. If business has invested in research and development in a cleanup technology that is eligible for the program, we suggest that more federal funds be given toward the practical demonstration costs. We are sometimes asking these companies to spend thousands of dollars to demonstrate their product; and if it is successful we say "Thank You", but we do not give them a job! As a financial incentive we would suggest funding the demonstrations or giving them the full cleanup job if the demonstration is successful. This would require sole source procurement which is contrary to existing open competition requirements.

4. Procurement

Sole source procurement, previously mentioned, is the only way to implement these technologies under government procurement regulations. As you are aware sole source procurement is highly discouraged. The Congress, EPA and the states must accept increased risks of sole source procurement. The hazardous waste treatment industry must also recognize this, accept it and not protest these awards.

5. Cleanup Standards

Flexibility is also needed in complying with ARARS. We suggest that if ARARS are almost met, a "no further action" may be acceptable for what is left as long as the protection of human health and the environment are assured. This would be an incentive to privately funded cleanups since it would reduce the risk of "doing it all again". However, as a regulatory agency we would cautiously move forward with this recommendation.

In conclusion, to address these and other related issues we recommend that advisory groups composed of a state representative from each EPA region and representatives of academia be organized in a cooperative effort. The application of innovative technology needs collective programatic input. The SITE program is doing what it set out to do; but we need it to do much more.

Thank you for the opportunity to address this committee on a most important program initiative.

Mr. TORRICELLI. Thank you, Mr. Putnam. Dr. Liskowitz?

STATEMENT OF JOHN W. LISKOWITZ, PROFESSOR OF ENVIRONMENTAL ENGINEERING, NEW JERSEY INSTITUTE OF TECHNOLOGY, ACCOMPANIED BY DAN WATTS, ASSOCIATE DIRECTOR OF THE NATIONAL SCIENCE FOUNDATION, INDUSTRY UNIVERSITY COOPERATIVE RESEARCH CENTER

Mr. LISKOWITZ. Yes, I would like this opportunity to thank you for allowing us to get the academic perspective into these hearings, as well as the industrial perspective.

New Jersey Institute of Technology has been actively involved in this area for a number of years. We have the National Science Foundation Industry University Cooperative Research Center, which has brought us in contact with industry and it has allowed us to enter into discussions with them about problems that they are encountering from the SITE Program.

I would like to point out that I think the SITE Program in industry in general feels that the SITE Program is an excellent concept. And there's one problem which was addressed earlier and that is the permits and how to deal with the evaluation of technologies. I would like to classify it as a catch-22 type of situation.

You have a technology you would like to evaluate on real materials. In order to receive the materials in quantity sufficient to evaluate the technology, you need a permit. But then you need to demonstrate that the technology works. So it seems to be a very difficult situation and we have encountered it, and I myself have encountered this problem in trying to evaluate technology. And one example is that I needed a 55 gallon drum of hazardous residue and I tried to get it for an evaluation and it was almost impossible. It was recommended that I carry it in one gallon pails or less, to deal with the situation.

So, accessing the quantities of hazardous materials for evaluation is extremely difficult. And I think that is a major problem that has hindered a lot of the industrial firms from getting involved in developing this technology.

What I would like to present, of course, is an addition to the SITE Program, and that is a pre-site evaluation program, where the technology, where access to the hazardous materials could be brought on board for evaluation of the technology, prior to going out into the field. The advantages of something like, at levels that approach field applications. The advantages of such an approach would be to evaluate the safety, the operational performance, cost effectiveness and environmental compliance of the technology.

The problem is that once you go out into the field with the technology, if you have not really evaluated that technology, you only get one point on the performance curve. And the reason for that is you really don't have the option of spiking it, in other words, you really cannot evaluate technology from a broad range perspective. You are limited to very site specific type of data. And our feeling is that if one were to create this pre-site evaluation program, which is tied into the SITE Program, I think it would benefit the technology and move a lot forward.

I also would like to address some of your questions regarding the industry. Industry does have technology to deal with. We also have access to foreign interests. We are creating a center in France, we are also talking with the English, which will facilitate bringing this technology into this country.

And I do, in my public, my testimony, do make some recommendations and offer the means whereby we can carry out this pre-site evaluation at the E-Tec facility that is being developed jointly by us and EPA in Edison, New Jersey.

So, I guess from a point of view of recommendations, I would like to recommend perhaps the use of a pre-site evaluation, along with the SITE Program. And the other part, which I think is extremely important, is to stimulate the enactment of the part Y under RCRA, under R D and D, as the two recommendations that we would like to make from our point of view.

Dan, do you have any additional comments?

Mr. WATTS. Not at the moment.

[The prepared statement of Mr. Liskowitz follows:]

Testimony on SITE program

John W. Liskowitz
Distinguished Professor of Environmental Engineering,
New Jersey Institute of Technology

Introduction:

The purpose of the SITE program is to solicit and evaluate commercial technology that can be used to control and treat hazardous waste at superfund sites. The SITE program is an extremely innovative program for bringing this new commercial treatment technology into the field for site cleanup but it has encountered unanticipated problems in the implementation of the program such as the availability of a sufficient number of appropriate sites for specific technology that has stymied its progress.

Problems:

Prior to the commercialization of treatment and control technology for field applications, data, as to the safety of the technology, operational performance, cost effectiveness and environmental compliance should be available so that the technology can be evaluated as to its suitability for a site containing specific hazardous waste. Such information would be extremely useful in convincing site managers to make appropriate sites available for demonstration of this commercial technology. At the present time, however, the best match between the technology

and the appropriate site is not occurring because of a lack of appropriate sites. Unfortunately, the evaluation of treatment and control technology for specific hazardous wastes is extremely difficult to carry out because of the many current statutory required permits that must be obtained from federal (e.g. RCRA, TSCA, etc.) state (laws governing air and water discharges) and municipal agencies by the vendors before they can evaluate their technology using actual waste. In reality, a "Catch 22" situation exists in that the vendors must demonstrate that the technology works prior to obtaining the permits that will allow them to accept the hazardous waste that will allow them to evaluate their technology. Thus, surrogate materials are being used for evaluation of the treatment technology instead of the actual hazardous waste. Such evaluation results do not completely predict the results obtained with the actual waste material.

These permits restrict the flexibility and capability of a vendor for developing and evaluating new and innovative hazardous waste treatment technology for commercialization in a timely manner.

In addition, the permits must be modified if the vendor desires to alter the technology to improve its safety, operational performance, or cost effectiveness in any manner that is not part of the original permit. As a result, the permits reduce the vendor's ability to optimize their treatment technology and generate the data on safety, operational performance, cost effectiveness and environmental compliance in a timely manner so that the technology can be matched with the appropriate sites and these sites can be made available for the evaluation of their

technology under the SITE program.

Recommendation

A pre-site unbiased evaluation of commercial technology under conditions that approach field conditions for treatment and control of hazardous waste prior to actual site evaluation is recommended. Such a pre-site unbiased evaluation of commercial technology will provide data on the safety aspects of the technology, operating performance, cost effectiveness and environmental compliance. The evaluation could include spiking surrogate feeds with the actual hazardous waste encountered in superfund sites to define the limits of the technology. In addition, operating the technology at less than optimum conditions will determine under controlled conditions the consequences of operating the technology under these conditions.

Such evaluation will benefit the vendors of the technology by providing them a wealth of unbiased data that will assist them in optimizing the performance of their technology for specific hazardous waste found at superfund sites as well as aid them in their efforts to market the technology. In the case of the SITE program, the data resulting from the pre-site evaluation program could be presented to the site managers to assist them in the decision process required to make sufficient sites available so that the desired match between commercial technology and the most appropriate sites can be achieved in the SITE program.

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Implementation of the Recommendation

The implementation of pre-site unbiased evaluation of commercial technology which has been studied for the SITE program should be possible in 1991. The E-Tec facility which is presently being developed in Edison, New Jersey through a joint agreement between EPA research and development and a consortium of Academic Institutions (New Jersey Institute of Technology, Rutgers, Princeton, Stevens and the University of Medicine and Dentistry of New Jersey) under the Technology Transfer Act can serve this need. The facility is being designed to evaluate hazardous waste treatment and control technology at levels where the results of the evaluation can be projected to field applications.

A novel approach to address the permit problems is being developed and will be implemented at EPA's E-Tec facility in Edison, New Jersey. The permits obtained through this approach will allow a variety of new and innovative technologies, along with their associated pollution abatement equipment, to be evaluated with actual hazardous waste streams in a timely manner. The permit approach deviates from the existing approaches in that it will secure permits that relate only to back-up air and water pollution abatement equipment that will receive all the discharges from the evaluation of the new and innovative technologies. In this manner, a variety of different technologies can be attached to the abatement equipment and

evaluated without the requirement for permit modifications. The permits will require that the capacity of the back-up equipment not be exceeded by the discharges from the processes being evaluated contain no pollution abatement equipment. In practice, however, the evaluation process will include both the treatment as well as air and water pollution abatement equipment that accompanies the technology. This approach will offer greater protection to the environment and to the public then is normally encountered under existing permits because the discharges and emissions from the processes being evaluated will pass through its own accompanying pollution abatement equipment before it is treatment by the permitted back-up air and water pollution abatement equipment of E-Tec.

BENEFITS OF THIS APPROACH:

A. The permitting of the back-up air and water pollution abatement equipment of E-Tec will allow the evaluation for commercialization of a variety of technologies with its accompanying pollution abatement equipment without requiring modification of the permits.

B. The approach used at E-Tec and the permits obtained can serve as a model for implementation of this permit concept in other areas of the country. It is apparent from our numerous industrial, academic and non-profit haz tox research organization contacts that these organizations will be able to use this approach and permits as a model to demonstrate to other states so that they may also be able to evaluate new and innovative technology for commercialization purposes.

What is Needed

In addition to the required operational permits such as air quality and water discharge permits, this facility must be permitted under RCRA and TOSCA. Because of the nature of the work to be undertaken in the facility a high degree of flexibility in operating conditions will be necessary. As an interim measure the RD & D facility permit authorized under RCRA will provide some of the needed flexibility. The one year RD & D process permit with the potential for 3 one year extensions will provide us with some of the flexibility needed if Congress will define the operational year as being based upon the operation time for test equipment for a 24 hour period rather than having one year on the operation of the facility as a whole. However, neither the regular RCRA permits issued under Part B nor a RD & D process permit can provide the necessary operational flexibility for this type of facility. An RD & D facility permit, as also authorized under RCRA part Y could allow the needed operational flexibility. Thus, EPA should be encouraged to issue the regulations and guidelines necessary to allow application for and granting of this type of permit so that it is available to the facility by the time it is operational in 1991. Thus, this permit combined with the back-up treatment capability expected to be authorized by the air and water permits can provide the necessary balance between research flexibility and protection of health and the environment.

Mr. TORRICELLI. Thank you both very much for your comments. I appreciate it. Mr. Putnam, clarify for me further if you could then, the States' reaction to trying to meet this problem of new mobile technologies. All of us share in the goal of having companies more willing to use these technologies, giving some form of blanket permits for them to better market their services. Dr. Skinner, Mr. Skinner before we address this, what is your reaction?

Mr. PUTNAM. Essentially, New Jersey would support it, however under the current laws it does not make it that amenable.

Mr. TORRICELLI. Current state laws?

Mr. PUTNAM. Current, well, state and federal.

Mr. TORRICELLI. We addressed the federal ones, we understand what needs to be changed.

Mr. PUTNAM. Okay, the state law essentially mirrors the federal law. We cannot be less stringent than the federal law. So if the federal law doesn't allow a state-wide permit, then we could not allow one and still be considered comparable to the federal law. And that is what I basically explained, that we lag behind the federal, because we have to be at least as stringent as they are.

Mr. TORRICELLI. I understand.

Mr. PUTNAM. We have about a year's lag, so——

Mr. TORRICELLI. Of the technologies we talked about earlier as well, my conversation with the previous panel, are there any, some, all of those which are a source of any considerable interest to the department today, as you look at the priority sites in New Jersey?

Mr. PUTNAM. New Jersey, I think we are promising the one we want to look at is the vitrification. We have some fairly large quantity wastes, the waste isn't such a large quantity, and vitrification appears to be what we consider a rather good walk away type of treatment. When you are done, you should be able to walk away from it. The general feeling of the state under the Superfund program because we are responsible for the long term maintenance of the remedial actions, is that if we can get a walk away alternative implemented, that is what is best for the state.

Mr. TORRICELLI. But by and large, the experience of today has not been the walk away alternative.

Mr. PUTNAM. Okay. I think the experience to date is reflecting some of our larger land fill sites. They were into the process sooner, they are the ones headed for clean up now. I think on the large land fills, you don't have much choice, you are going to contain that facility when you are looking at 6 million cubic yards of material that took 20 years to get there; it will take half as much time as to try to remove it. There is no place really to take it, it is kind of a mixture of solid waste and hazardous waste. I don't think those are going to go anywhere. Containment may be the only thing.

Mr. TORRICELLI. Well, why is this, in their heavy metals, why are solidification not an answer for those problems?

Mr. PUTNAM. Okay, solidification in a landfill you are dealing, your chances of success would not necessarily be amenable to it. You are talking about a very non-homogeneous material. One minute it could be a stack of newspapers, the next five feet of fill could be an automobile. I think from a practical standpoint, it would be very difficult——

Mr. TORRICELLI. I guess we are talking about different sites. I was talking about the lagoon type of incidents that we have, some prominence in New Jersey, large chemical contaminations.

Mr. PUTNAM. I think again the stabilization is being looked at primarily only from a heavy metal, a metal standpoint. And the——

Mr. TORRICELLI. We have a variety of large lagoons in the states that are heavy metals.

Mr. PUTNAM. Yes.

Mr. TORRICELLI. But they are of course unusual mixtures that no one, absent testing, would even know what was at the site. Why are they not good candidates for solidification?

Mr. PUTNAM. Okay, the—only because if we run across one that is simply heavy metals, they would be candidates. I think the problem is we are probably dealing with oily sludges as well as other organic chemicals mixed in with it.

Mr. TORRICELLI. And they are mixed?

Mr. PUTNAM. Yes.

Mr. TORRICELLI. And why then are some of these intense head incinerations not better answers, simply because of the volume?

Mr. PUTNAM. I think we are using the incinerators to a very large extent. We are, the Bridgeport Reynolds site that was mentioned is an, is going to be incinerated. The Bog Creek Farm site is also utilizing incineration. We are considering various forms of thermal treatment at smaller sites.

Mr. TORRICELLI. It appears to me that there is a heavy prejudice towards simple landfills, or containments that are lagoon sites.

Mr. PUTNAM. I think the, from the publicly funded clean up sites, the Superfund sites that the State of New Jersey is handling, we do not have that many lagoons and we are not necessarily looking to discount them. I know in a few other industrial sites, closure of them under the laws allows for capping and the industry, again, is reluctant to use the private industry doing their own clean ups. I think they are reluctant to try innovative technologies, because they may not work.

Mr. TORRICELLI. Because of a confidence level?

Mr. PUTNAM. I think it is a confidence level. I mean, what I have noticed——

Mr. TORRICELLI. Even when they come, even if a technology comes to the SITE Program and it has been tested and the federal government recommended it at a Superfund site, you still believe companies are going to be hesitant on a confidence basis?

Mr. PUTNAM. I think they are going to be hesitant because there is always the site specific chance that it is not going to work. And the government——

Mr. TORRICELLI. And they know that simply putting it in a landfill——

Mr. PUTNAM [continuing]. Not necessarily going to care whether it worked or not, you have a clean up goal to get to, if you do not reach it on the first try, then we try it again. And I think their, private companies, private industry, will be hesitant about trying to invest twice in the same plan.

Mr. TORRICELLI. Well they may be hesitant, but should not government be hesitant then too, if there are alternatives available, a

permanent solution that is appropriate in incineration or an appropriate answer in solidification, or other new technology, which may be more money in the short term, but avoids the long term societal risk of this material being maintained; being in a landfill which we know is going to develop a problem in future years, I am not certain I think that the option should exist to the company if using it's "safe" or in potentially short term option of landfill. Why does the state not eliminate the confidence question by telling them that long term landfill is simply not available as an alternative?

Mr. PUTNAM. I do not believe we currently would have the—currently the laws and regulations allow them to do it. I do not know how far we would get if we would force them.

Mr. TORRICELLI. Well, what are the operational words and the definition that you work with in the kinds of process that must be used? Is it best available, the safest, most practical, how wide is your judgment?

Mr. PUTNAM. Okay, we pretty much allow, we define to them what we consider clean. What their clean up standards, they would have to meet, for their various contamination. If they are funding it themselves, they pretty much can get to that point anyway they see as the best way to get there.

Mr. TORRICELLI. Well, you can interpret clean as to mean not clean for 1989, but clean in societally safe for a generation, at which point it is going to be difficult for people to use landfill alternatives.

Mr. PUTNAM. Right now, I do not think that we have what we would call a hammer to force them out of the landfills. I cannot really think of one off hand.

Mr. TORRICELLI. Well, into this, I suggest—I would assume if the state legislators thought that were a problem they would give you that authority. Is it the position of the department that they would like better authority in order to get better alternatives to be used?

Mr. PUTNAM. Okay, I think the department has a hierarchy of waste, disposal waste recycling. Land filling is, of course, at the bottom of it.

Mr. TORRICELLI. But yet, it is used the most often.

Mr. PUTNAM. It is, I think it is used the most often, primarily on the private side for expediency.

Mr. TORRICELLI. Let us interpret that is because it is cheap, it is short term.

Mr. PUTNAM. Well, it is the easiest to recognize.

Mr. TORRICELLI. It is cheap, short term. The reason we got into this entire SITE Program is exactly these reasons, because the states and the federal government were favoring landfills, which in the long term were dangerous, they were a stop-gap, but they saved money, they were easy to understand and to sell and people were doing it. We can make the technologies available and we can have EPA do the testing as they are doing and people just spend time in a laboratory and come up with them, but none of this is going to be of any meaning if you are not going to help force companies to use them.

Mr. PUTNAM. Okay. The companies that are with, are in NPL sites, that are required to go through the NPL process, are forced to evaluate the innovative technologies and the government basi-

cally chooses what we feel is best. So, in some of the decision down the road I think you will start seeing the government forcing private companies in the larger clean ups to be using these. I think what we are seeing on the other side is, the ones who are not, not in the small sites, the smaller sites, where the expedience is a much larger factor if you are only dealing with a few thousand yards of material.

Mr. TORRICELLI. Dr. Liskowitz, your experience thus far as someone who sees companies and scientists who are doing work in the field, tell me about the reaction when they go to the SITE Program with a technology, the impediments to having it tested, the principal problems in your judgment?

Mr. LISKOWITZ. Well, one of the problems is of course the delay in getting approval or accepted into the program.

Mr. TORRICELLI. The time from which you first contact the program to when you are notified whether or not you will be evaluated?

Mr. LISKOWITZ. Right, but there is an——

Mr. TORRICELLI. How long has that taken in your experience?

Mr. LISKOWITZ. Well, they have been talking a year or more, to get into the bureaucracy. A bigger deterrent is the fact that a lot of these companies really feel that the technology, although it is good, it has not been tested to the level that they can utilize, and this thing——

Mr. TORRICELLI. You mean after it has come out of the SITE Program?

Mr. LISKOWITZ. I beg your pardon, before they get into the SITE Program.

Mr. TORRICELLI. Before they come in, well I——

Mr. LISKOWITZ. In other words they may have a technology that has been developed on a lab scale or at a small pilot scale level, but it really, they really do not know how well it will perform on the field scale level. And they would like to evaluate it further, but they just cannot. Even firms that have Part B's, have difficulty evaluating technology that they have developed, because it is not part of their permits. And it is a serious problem and a lot of them just give up in disgust. I know several cases where they have been in this process now for three to four years, or even longer, trying to get around this barrier, so that they can access sufficient quantities of waste to evaluate their technology.

So that is a real big deterrent to this program. I know we are actively involved on the non-Superfund sites and evaluating technology that is being developed in the Center. Maybe Dan, you would like to briefly mention.

Mr. TORRICELLI. Yes, I would like to hear about it if I could at NJIT, your own research center now——

Mr. LISKOWITZ. Yes.

Mr. TORRICELLI [continuing]. Its environmental center, what technologies you are now emphasizing?

Mr. LISKOWITZ. We go across the board. We have——

Mr. TORRICELLI. Do you have any that are in or likely to go to the SITE Program?

Mr. LISKOWITZ. No, we are, Dan maybe you better——

Mr. WATTS. Well, actually we have a couple of approaches, at least two, which may fit into the SITE Program. We are now going through the same kind of process, I think, that every company would, to identify how much we need to know about our process before we can become even applicant to the SITE Program. There are questions, obviously, about can we demonstrate our process, originally on a pilot scale to get enough information to convince the people who run the SITE Program that this is a merit. We also have some concerns about funding the demonstrations ourselves. For example if the university on its own is going to be in the SITE Program, it is going to be difficult for us to find the funding to actually do our part of the demonstration, if we have to build a full scale, almost full scale field demonstration equipment.

Mr. TORRICELLI. Well, how about the step below that, this emerging technology program. Does that meet the need?

Mr. WATTS. I think it comes closer to meeting our need. I have not yet had a chance to really match up all of the——

Mr. TORRICELLI. So you have not tried to take advantage of it yet?

Mr. WATTS. Actually I have just sent for the, just received the information about that. I am in the process of going through that to see if in fact we can. If everything is as it appears to be, I think we could enter into that program. I know of some other universities who have gone farther in that process than we have, and part of that comes from when they actually started developing the technology.

Mr. TORRICELLI. Now, absent the emergent technologies program, you do have corporate involvement, as I understand it?

Mr. WATTS. Yes.

Mr. TORRICELLI. Have those sponsors not availed themselves to make funding available for smaller pilot programs, as well?

Mr. WATTS. Yes, we have in fact underway at the moment, at a site in New Jersey which belongs to one of our member companies, what amounts to a field demonstration of a particular kind of clean up technology, a biological treatment. There are other of our sponsoring companies, who have other kinds of specific sites, where they think that some of the technology we have developed, or have carried on, may be applicable. So, in some of those cases we would like a long range plan maybe to actually do a first pilot type demonstration on a site, gathering enough information to allow that technology to go further. Perhaps in the SITE Program, or perhaps directly to some marketing kind of activity outside the SITE Program.

Mr. LISKOWITZ. Our sponsors have made sites available to us where we are now going to implement this technology in the field. So they are willing to pay.

Mr. TORRICELLI. And you have not chosen any one particular emphasis in the range of technologies. So all the way from new kinds of incineration through solidifications——

Mr. WATTS. Biological treatment——

Mr. TORRICELLI. Or biological——

Mr. WATTS. The whole spectrum.

Mr. TORRICELLI. You have looked at all of them.

Mr. LISKOWITZ. That is right.

Mr. TORRICELLI. You doing this with Rutgers and Stevens?

Mr. WATTS. Rutgers, Stevens, Princeton University, NJATN, the University of Medicine and Dentistry of New Jersey, the five universities.

Mr. LISKOWITZ. And now of course, Tufts and MIT are involved.

Mr. TORRICELLI. Which has corporate money in it and state money?

Mr. WATTS. That is correct.

Mr. LISKOWITZ. Yes.

Mr. WATTS. As well as federal.

Mr. TORRICELLI. Of course.

Mr. LISKOWITZ. But a point to be made here is that industry is defining the sites where the technology is appropriate. In other words, the match of the trying to take the technology and forcing it at the site is not occurring. They have, they are fully aware of the sites that they have problems and they say this technology will work here. And I think that is a problem that is not, that is something that is not happening now, as——

Mr. TORRICELLI. That is a problem, how would you solve it?

Mr. LISKOWITZ. Well, I think to generate the data base, you know, I recommended this pre-site evaluation to generate enough of a data base on the performance of the equipment which could——

Mr. TORRICELLI. Well, the data base is an appropriate answer if their hesitation is legitimately based on concern with the technology and its success. The data base is not a sufficient answer, if they are simply trying to avoid a cost.

Mr. LISKOWITZ. I do not think that is the case. I think cost effectiveness is part of the package but confidence in the technology is very important. They have gotten burned a number of, I'm now speaking from the industrial side. They have gotten burned a number of times with technology. And they feel that when they are going to invest their dollars, they want a solution. In other words, moving it from one hole to the other is not industry's answer either, because they are just moving the liability, eventual liability somewhere else. They would like to deal with the problem, get rid of it. But the lack of confidence and in lack of a sufficient data base so that they can evaluate the technology.

Mr. TORRICELLI. I hope you are right. I will tell you on the surface it appears that they may be interested in answers, you may not think there are shifting problems, but it appears to me that a lot of shifting of the problems from the tenure of this Chairman of the Board, to the tenure of the next Chairman of the Board. And landfilling is appropriate for that shift of responsibility. The next board will deal with it, however, in future years' earnings.

Mr. LISKOWITZ. Right.

Mr. TORRICELLI. Landfilling is uniquely suited, with that approach.

Mr. LISKOWITZ. To shift—I, well, I guess I am speaking from, I guess, the 32, 33 firms that I have had an opportunity to interact with closely and talk to upper management, with regard to their thoughts. And they feel that even on the European scale, they feel that now they have got to adjust the problems, they cannot, you

know, just move it over to the next, to somebody else's headaches. I think that awareness seems to be coming through across the board.

Mr. TORRICELLI. Well, from everything that I can tell that you reached that judgment long before we have. Is there anything else about the program, as it is operating today, the SITE Programs specifically, that any of you would like to see us change in its operations, other than what we have already cited in the hearing—otherwise working to your satisfaction?

Mr. LISKOWITZ. I think that it is, I think the permit situation has to be addressed. The ability to go in to demonstrate the technology and then have the ability to go to sites without having to reevaluate the technology to every site——

Mr. TORRICELLI. That was the mobile permit question.

Mr. LISKOWITZ. The mobile permit is extremely important. I think that would move things much faster and encourage more industry to develop the technology and bring it to the——

Mr. TORRICELLI. But otherwise, your principle concern is time?

Mr. LISKOWITZ. Time is——

Mr. TORRICELLI. Between initial contact——

Mr. LISKOWITZ. And money.

Mr. TORRICELLI [continuing]. And when the report gets to them.

Mr. LISKOWITZ. And the money that goes——

Mr. TORRICELLI. And the money for the more preliminary technologies?

Mr. LISKOWITZ. That is right. I think that if you make that available to industry, they will move into it. If they go through the expense once and demonstrate under the worst case scenario that that works and this now allows them now to go and market their product.

Mr. TORRICELLI. Are you attracting a quality of student interested in this field, that one might imagine? Is it a competitive discipline within the university community?

Mr. LISKOWITZ. Students to type—yes.

Mr. TORRICELLI. A place where students want to be?

Mr. LISKOWITZ. Yes, that is where the action, we see the engineers moving into this, you know, in a large way from an academic point of view. In fact this is where the action is as far as the jobs are concerned, and of course that is a—that really stimulates them.

Mr. TORRICELLI. Mr. Putnam, any closing thoughts on what else you would like to see this committee do with the law?

Mr. PUTNAM. I believe we have pretty much covered the things we see. We do like the SITE Program. I think we just want to get a little more involved in it and to try to shape it more towards our, what we see we want from it.

Mr. TORRICELLI. Very good. Well, I thank you all for your participation. It has been very helpful and I appreciate your thoughts. Thank you very much.

Mr. LISKOWITZ. Thank you.

Mr. PUTNAM. Thank you.

Mr. TORRICELLI. Our third and final panel please. Richard Fortuna, Hazardous Waste Treatment Council; James Malot, President, Terra-Vac, Inc., Carl Brassow, President Soliditech.

Gentlemen, welcome and thank you for your participation today and your patience. We appreciate it very much. We would like to

hear from each of you, if you have a brief statement you would like to enter, it will be entered into the record in its entirety. Please feel free to cite from it if you would like at the outset. Mr. Fortuna.

Mr. FORTUNA. Thank you, Mr. Chairman, I appreciate the opportunity to be here today.

Mr. TORRICELLI. Please also try to speak in as loud of a voice as possible.

Mr. FORTUNA. Okay, is this loud enough, or——

Mr. TORRICELLI. Yes.

Mr. FORTUNA. Fine.

Mr. TORRICELLI. Just keep it up.

STATEMENT OF RICHARD C. FORTUNA, EXECUTIVE DIRECTOR, HAZARDOUS WASTE TREATMENT COUNCIL

Mr. FORTUNA. I am Executive Director, as you know, of the Hazardous Waste Treatment Council and we represent 70 firms nation wide of established and merging firms that provide the technological services to treat daily hazardous waste and clean up Superfund sites.

They are firms that are distinguished by their common recognition of being in the business of environmental protection, not simply an ordinary business.

We were supporters of 1984 amendments to RCRA, 1986 amendments to Superfund and we are very pleased to have worked with yourself and the Science Committee and really making, insuring that the elements of the SITE Program were maintained in the circular re-authorizations.

We are also currently working on our second annual review of the Superfund remedy selection process, which is really where the rubber meets the road for all of these efforts. Our report is being prepared in conjunction with six of the nation's leading environmental groups. This is our second annual report looking at the actual types of remedies being selected, the basis by which they are being selected and the extent to which the 1986 amendments are being conformed.

Eight of our 28—eight of the 28 member companies in the SITE Program are Treatment Council members. And we also were very pleased in participating in EPA's recent 90 day management review that Administrator Reilly recently issued, establishing a number of major managerial reforms in the Superfund Program.

I have two major observations to share with you this morning, Congressman, and three key points in the testimony. One is that the, frankly, that the SITE Program is one that has a number of problems at present. But, I think as your colleague Mr. Scheuer has been frequent to observe at times, we should not let the perfect be the enemy of the good.

I think the criticisms that I will provide to you this morning are not ones that cannot be overcome and certainly cannot speak to the overall merits of the SITE Program. We certainly support the SITE Program, but there are a number of changes that need to be made to make it operate more efficiently and effectively, to truly make it an integral part of Superfund Program, and not simply an academic satellite activity.

The second major observation I want to share with you, Mr. Chairman, is that as important as the SITE Program is, and I think as optimistic as we are about making it work, it is a dependent variable. It is dependent first and foremost on the policies that the administration pursues in selections of remedy. If we continue to see a trend toward the selection of capping and contain remedies that you talked about earlier, no matter how good we make the SITE Program, it is not going to make any difference in terms of the permanence of the remedies that are selected. And that policy is most vivid or visible in the context of the administration's amendments to the National Contingency Plan.

To the extent that the SITE Program needs attention, certainly the NCP, needs the attention of this committee and the Congress to insure that some of the initial recommendations and policies being pursued relative to particularly the role of costs which you talked about earlier, are not finalized in the NCP, because frankly they will dwarf any of the changes and benefits we can derive from the SITE Program.

Three key points, Mr. Chairman. One is, or points of criticism. One is that the SITE Program at present is really not focused on what we would say emerging technologies or providing higher quality data on both costs and technology performance.

It is to a large extent right now, the technologies being selected and the projects being recommended, are really a reflection of the lack of doing appropriate treatability testing at the sites today. It is a form of a stop gap program if you will, to do what should be being done on a routine basis at Superfund sites. Testing a range of technologies, since most sites are different from one another, and finding out what the different site-specific matrix effects of that waste are in that technology. To that extent the SITE Program has really been a stop-gap measure and it has not really focused on what we think where it should be.

Mr. TORRICELLI. Because otherwise it is not happening at all other sites?

Mr. FORTUNA. That is right. I mean there has been so little treatability testing done at Superfund sites that people feel, well, this is the only way to really get my spurs if you will, or show if this technology works, or show if this technology worked in one context, now it will work in this context. So the SITE Program has really sort of been looked on as a way, as a stop-gap measure for what we should be doing, being done more routinely at Superfund sites.

I will have some recommendations as to if we do start doing that Superfund, how should we then refocus the SITE Program, or how we should restructure it.

Secondly, and I think very, of equal significance is the fact that the SITE Program is really not integrated if we have any selection. As you see in our testimony, we identified the fact that we have looked at 225 records of decision, through fiscal year 1987 and 1988, and in only five instances was the SITE Program ever mentioned. Now again, that may well be a function of the learning curve problem, we are in several learning curves at the same time, but the SITE Program really seems to almost be a, as I said a satellite operation, relative to remedy selection.

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And third, I think a universal concern is that the process has really just been too slow. It has just taken far too long to get technologies put through the SITE Program and to have results provided.

Those are the three basic conclusions or criticisms we have of SITE. Maybe I could briefly summarize our recommendations, relative to changing the SITE Program, dealing with some additional legislative changes and administrative changes of the program.

Again, first and foremost, Congressman Torricelli, the, I cannot emphasize enough how important it is to change the policies expressed in the administration's first draft of the National Contingency Plan. If the role of cost remains as stated in that draft, we are really going to see nothing but a recapitulation and a continuation of the cap and contained type of remedies that have plagued this program through its first eight years.

Something is seriously wrong when two of the leading companies who provide mobile incineration services decide to close their divisions or get out of the business, because there are simply more mobile incinerators out there than there are mobile incineration jobs. I simply pick on that as an example, not necessarily that we are so focused in on incineration.

The second recommendation is that there has to be some type of formal integration of SITE Program results, or SITE Program data basis, with remedy selection. I mean it could be something as routine or mundane as replying that regional project managers, or site—the clean up program managers have to check off or check with the SITE Program in terms of what is their cost data base and what has been the performance of this technology. Something very routine, but I think something that would be very profitable.

Thirdly, I think that the SITE Program results have to be reported on an objective basis. Namely, what did this technology do in achieving land disposal bans, what did it do in terms of achieving other ARARS or appropriate applicable relevant appropriate standards from the Clean Water Acts, say Drinking Water Acts, et cetera. It has to—it has to perhaps report how well it did in terms of the EP Toxicity tests for leaching of metals. The results have to report enough not qualitatively, but to the fullest extent we can quantitatively. And that is not to say because the technology did not meet land ban, it should not be selected, but rather we have to establish the limits of that technology, what are the capabilities of it across a range of wastes.

Thirdly, we need to focus our technologies on those technologies that focus our efforts in terms of remedy, the projects being selected in SITE that are the most frequent ones we are encountering in the field. Bioremediations, location are two of the major complimentary technologies to our established capabilities in thermal destruction and other forms of stabilization, that really need priority attention. And again there has to be some check here relative to remedy selection process.

As you heard Mr. Skinner observe quite accurately, they have never seen a stabilization technology for organic waste that has worked to date, when you actually try to determine whether it chemically has bound the material. That we would echo those results 100 percent. But when you look at the principle technology

"that has been selected" in fiscal year '88 at Superfund sites, guess what it is, it is organic stabilization. There is no check and balance relative to SITE Program results, relative to the principal remedies being recommended and that is a problem, what is the purpose of this program.

And our last recommendation that is in terms of giving the Super—or giving the SITE Program a new focus and energy, rather than simply being the stop-gap measure for treatability tests, that what should be performed routinely at Superfund sites, we really think that the SITE Program needs to focus on the integrations of technology.

Heretofore, we have looked at stabilization, vacuum extraction, incineration, bioremediation. All in relative obscurity or almost in a vacuum to one another. We really see that the trends in technology are two-fold. One is that the technologies that are really emerging are those that are capable of separating the wash and wear from the drip and dry. But the principal problems at Superfund sites are materials management problems, getting the organic wastes to form where they can either be bioremediated, incinerated or reclaimed. Getting the metals in a form where they can be stabilized a lot, across interferences with organics. That is a principal problem.

The other problem is that we—it reflects itself in remedy selection too—is that one technology or one size fits all is not the silver bullet for this program, or for Superfund certainly. We need to begin looking at mixed remedies of vacuum extraction, bioremediation, bioremediation with incineration and otherwise. And I think, again, the focus of the SITE Program ought to be looking at integrations of technologies, because that is how we are going to—that is how we are going to do two things, stop or cut off the otherwise what appears to be the competition or the fight between costs and effectiveness. In other words, you know, there is a lot of discussion on the National Contingency Plan and by the administration about how the goals of cost effectiveness, permanence and the pace of clean-ups are in competition with one another. We do not necessarily see that a short term remedy, or a short term fix that comes in saying it is similar to lagoon and does vacuum extraction for the volatile or bioremediation over a longer period of time, combined with some form of capping, is inconsistent with the definition of permanent remedy, but that is how the Superfund program is operated.

It is one size fits all and the perfect the enemy of the good. The way out of the woods on this is to focus our more costly technologies on the truly concentrated parts of the site and leaving those, the longer terms technologies that are more cost effective, perhaps to larger volumes of the waste over a longer period of time, in conjunction with some form of capping or recognition that some waste may remain at the site.

So that there are, I think there is not only room for all technologies, but I think it makes sense from a public policy and resource conservation standpoint to begin looking at mixed remedies, which I think the SITE Program could well take the lead in. Thank you, Mr. Chairman.

[The prepared statement of Mr. Fortuna follows:]

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TESTIMONY

OF

RICHARD C. FORTUNA
EXECUTIVE DIRECTOR
HAZARDOUS WASTE TREATMENT COUNCIL

SUPERFUND INNOVATIVE TECHNOLOGY EVALUATION ("SITE") PROGRAM

BEFORE

SUBCOMMITTEE ON RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

JULY 17, 1989

I. BACKGROUND ON HWTC

I am Richard C. Fortuna, Executive Director of the Hazardous Waste Treatment Council ("HWTC"). The Hazardous Waste Treatment Council is the largest national association of hazardous waste treatment facilities, cleanup firms and equipment manufacturers that support the primary use of treatment technology and the restricted use of land disposal in the management of hazardous waste. The Hazardous Waste Treatment Council was founded in 1982, and today represents over 70 firms that view the hazardous waste industry as the business of environmental protection. In addition to being the industry leader in the legislative reforms of RCRA and Superfund, the HWTC has also lead the way in implementing necessary changes to the full spectrum of regulatory activities including defining the scope of RCRA coverage, sham recycling, management standards/restrictions, facility permitting, federal/state relationships, and permanent cleanup of the nation's problem waste disposal sites.

II. OVERVIEW

It is our pleasure to testify here today on the Superfund Innovative Technology Evaluation ("SITE") program. Our interest in the SITE program is two-fold. First, over the past two years, we have been extensively involved in reviewing Records of Decisions (RODs) for Superfund cleanups in this country. We, along with five major environmental groups, have comprehensively reviewed each FY 1987 and FY 1988 ROD to ascertain trends in cleanup decision-making. We have previously reported several major shortcomings in the program with regard to use of treatment technologies, including: (1) that treatment is not used to remedy a large number of situations, with containment of the waste being used instead; (2) that there is only token amounts of treatment used at many sites, and (3) that inappropriate or ineffective treatments are sometimes selected for remediation. We are keenly interested in the SITE program and the promise it offers to Superfund for increased use of permanent treatment technologies.

Second, we are interested in the SITE program because we directly participate in it; of the 28 companies enrolled in SITE by January 1989, 8 belong to the Council and other members are considering applying for future demonstrations. Increased participation by our members will depend to a large extent on the success the program has in increasing the appropriate use of permanent remedies at Superfund sites.

Overall, we have been pleased with the goals established by the SITE program and have found the personnel operating the program to be helpful, knowledgeable, and cooperative. We have had ready access to SITE data in draft and final documents, which is not generally the case in many EPA programs, and have found the information to be well presented. However, it is premature

to comprehensively review the program and render judgment on it, since few reports have been finalized from even the first solicitation year. Thus, our testimony will be comprised of "first impressions", so to speak. We look forward to future hearings by this Committee to further assess the SITE program.

III. PRINCIPAL OBSERVATIONS

Our testimony will focus on the following three areas: (1) whether the SITE program has generated important and useful information for the Superfund program to date; (2) whether the results of the program have been used by the Superfund program to date; and (3) the experience of our membership in participating in the SITE program.

1. Is the SITE program generating important and useful information for the Superfund program?

As discussed, a major flaw in the current Superfund program is the program's dismal record with regard to selection of appropriate technology for cleanup of Superfund sites. To improve the track record on this important issue, it is critical that the SITE program provide two sorts of data: (1) performance and cost data on technologies that would otherwise not be considered for use by the program, such as technologies for which field scale or commercial scale data are not available; and (2) performance and cost data on technologies which require laboratory pilot and bench scale evaluation prior to field demonstrations. Furthermore, the data generated by the SITE program should be as broadly applicable to other sites as possible; whereas a simple treatability study at a Superfund site prior to the selection of a remedy should be oriented strictly to tailoring the treatment technology to the site conditions, testing in the SITE program should attempt to delineate conditions under which the technology performs optimally so as to maximize the usefulness of the data to other sites in the Superfund program. Lastly, the SITE program should provide research quality data, with adequate replicates and quality control that interpretation of the results is straightforward and uncontroversial.

To date, the scope of the SITE program has not strictly conformed to the goals outlined above; several of the technologies that have entered the SITE program have been proposed for use at hazardous waste locations already. For example, SITE plans to test the in situ vitrification technology in the upcoming year, but this technology has already been proposed for use at one Superfund site, and the ROD for this site states that the technology has had four full demonstrations and

43 pilot tests. Using the SITE program's stated goals to test technologies that would otherwise not be considered for use by the program, it does not appear that SITE testing should be a priority for this technology.

However, if the SITE program provides a higher quality data base for vitrification and other technologies at similar levels of development, the SITE tests may nonetheless prove useful. Thus it is critical that SITE either provide information on technologies not field tested to date or provide higher quality data on cost and performance than has been available for the technology to date in order for the program to make a meaningful contribution to Superfund.

Since Superfund has performed almost no site-specific treatability studies prior to the selection of remedies at its sites, no data base exists on many technologies that have received limited use in Superfund field applications. In the absence of such treatability studies, the SITE program is appropriately testing several technologies being used on a relatively routine basis at sites, such as bioremediation and vacuum extraction.

Such testing is appropriate for the SITE program scope given the current Superfund program limitations, but it precludes the Agency from expending more resources on truly innovative technologies that would not be considered for use in the absence of SITE data. We strongly endorse the 90-day review recommendation that the Superfund program institute treatability testing prior to the selection of a remedy at each Superfund site. Following this change, the SITE program should move away from simply treatability-type testing of technologies for which considerable data will be generated by the program. Furthermore, we urge the SITE program to distinguish itself with the type of data it collects when testing a technology. SITE testing, much more so than treatability testing, should be oriented to elucidating limitations in the technology effectiveness so as to ensure that the technology is ultimately used in optimal locations only. To date, the SITE demonstration reports do not provide data that can be broadly interpreted for other sites and other wastes.

2. Are the results of the SITE program being used by the Superfund program?

A review of the FY 1987 and FY 1988 RODs indicates that the SITE program is not yet being used to any meaningful extent by Superfund. There were less than five citations to findings from SITE in the 225 FY 1987 and FY 1988 RODs, for example, and the handful of citations we found occurred for the most part where a ROD was signed at the very location where the SITE project had been demonstrated. In only one instance, at the Keefe

Environmental Services Site in New Hampshire, were the findings of the SITE program at one location cited as the basis for the selection of a treatment remedy at another.

On the other hand, there are numerous sites that could benefit from even the limited number of SITE reports and information generated to date. As many as 47% of the FY 1988 RODs failed to use treatment at all, and these RODs often cited a lack of technology capable of addressing the problem at the site as a reason for failure to select treatment. For example, the MGM Brake site in California, contaminated with high levels of PCBs, considered only incineration and offsite disposal of the waste on site and rejected the incineration option based on community concern. Other technologies, such as active soil washing, currently being tested in the SITE program, were not considered. Similarly, at the Yaworski Lagoon site in Connecticut, only incineration and containment were considered where technologies such as vacuum extraction and bioremediation, both in the SITE program, could possibly have been appropriately applied to large portions of the site.

Often, treatment technologies are rejected based on inflated estimates of costs for operation and do not refer to SITE data which show lower costs for a given technology. For example, incineration is often rejected in the RODs based on cost estimates as high as $800/ton. However, the SITE data shows that modified incineration designs such as the Shirco Infrared Incinerator operate at a cost of less than $200/ton. Given that a stated goal of the SITE program is to provide accurate and reliable cost data on field scale technologies, the Superfund's failure to even refer to the SITE program numbers is very disappointing.

Perhaps most troublesome to the Council is the fact that many sites have opted to treat organic wastes using organic stabilization technologies despite the fact that to date the SITE program data indicates that such technologies are not effective because they do not immobilize the hazardous constituents. Organic stabilization has been selected during FY 1988 for 11 sites: Charles George Reclamation, Massachusetts; Love Canal 93rd Street, New York; Chemtronics, North Carolina; Mid-State Disposal, Wisconsin; Velsicol Chemical, Illinois; Bailey Waste Disposal, Texas; Industrial Waste Control, Arkansas; Arkansas City Dump, Kansas; Selma Wood Treating, California; Commencement Bay Nearshore, Washington; and, Pacific Hide, Idaho. As such, organic stabilization is being selected more often than any other treatment technology for contaminated source materials except incineration (to be used at 24 FY 1988 sites). Yet the SITE program indicates that this technology does not work for organics, and, ironically enough, at the site where the technology was tested, a decision was made to incinerate the waste instead.

The SITE program remains interested in organic stabilization and is testing the processes of several other vendors. We support such additional testing to further elucidate the capabilities and limits of this treatment approach. Nonetheless, we are extremely troubled by the widespread use of the technology for cleanup where the only data we have to date from SITE indicates poor performance.

Perhaps the single most important reason that the SITE program has been overlooked during selection of remedial actions to date at Superfund sites is timing; the FY 1987 and 1988 RODs were, for the most part, signed before any documents on SITE demonstrations were published. If this is the case, we should begin seeing increased citations to SITE results in the FY 1989 RODs. A second reason for the lack of use of SITE data may be the failure of the Superfund project officers to consult with the program and gather the appropriate information for selection of remedies for their sites. This possibility was recognized in the recent 90-day review of the Superfund program undertaken by the EPA administrator and will be somewhat ameliorated by the proposed technology teams EPA proposes to create in its Office of Research and Development. We urge that this committee oversee the use of the SITE data by the Superfund program in the upcoming months to ensure that maximum use is made of the data obtained in the program.

3. What is the experience of some companies who have participated in the SITE program to date?

The primary focus of the SITE program has been the Demonstration Program, where technologies tested are fairly well developed but operating experience in the field is lacking. The developers, which participate in the SITE program, are responsible for transporting and operating their equipment during the demonstration while EPA assumes the remaining costs for planning, sampling and analysis, and evaluation. Although the law allows funding for up to 50% of operating costs when developers cannot pay, the terms are quite restrictive, and the Agency has to date not provided funds directly to any developers. Our members report that participation in the SITE program has been unexpectedly costly from a time and dollars point of view, and they are anxious about the return to them in terms of increased market demand for technologies that test successfully. They are concerned that the return may not be worth the investment, based on the long lag between participation and published results which the firms can use to market their technology. Furthermore, to date there has been little obvious benefit to SITE participation that would not come to the company by simply undertaking a successful treatability study at a site.

EPA has been somewhat responsive to this problem, acknowledging in the 90-day review that the program should provide more rapid dissemination of results and has instituted the issuance of performance bulletins and reduced production time for full reports in an effort to make results known in a more timely manner. Further, headquarters work that the would force Superfund project managers to consider the technologies that have proven promising in the SITE program for application at each of their sites would provide additional incentive for our member companies to participate, as it would enhance the number of business opportunities for the technology as a direct result of participation in SITE.

IV. CONCLUSIONS

In summary, we support the SITE program and consider it beneficial to the long term interests of enhancing the use of permanent remedies at Superfund sites. Although it is too early for definitive conclusions, we believe the program holds great promise if the process and basis for technology evaluation can be integrated with the remedy selection. Revisions to the SITE program are necessary to ensure that the program plays a useful role in encouraging greater use of treatment technologies and objectively evaluating their performance, especially if the Superfund program institutes a policy of aggressive site-specific treatability studies prior to the selection of remedy at Superfund sites. To provide an objective basis of comparison and evaluation, SITE program evaluations should be reported in terms of their capability to achieve the environmental protection benchmarks of relevant environmental statutes and be structured to test the limits and constraints on a technology, not simply report results based on the optimal conditions. Lastly, the Agency should continue its efforts to streamline participation in the SITE program and accelerate dissemination of results such that there are obvious benefits to participation for candidate treatment companies.

Mr. TORRICELLI. Mr. Foruna, that is extremely helpful, there is a variety of very good ideas. We look for ways to adjust the program, but it is a very thoughtful analysis, I appreciate it very much.

Mr. FORTUNA. I have some other recommendation on legislative changes, perhaps it could wait——

Mr. TORRICELLI. I thought that you might.

Mr. FORTUNA. Or would you——

Mr. TORRICELLI. We would like to receive them, but first any other ideas that you do have, that we don't get to today, please either submit to us during the record, or simply correspond if you would, we would like to gather a variety of ideas that came out today for possible legislative changes. That is very helpful.

Mr. FORTUNA. Thank you.

Mr. TORRICELLI. Mr. Brassow?

STATEMENT OF CARL BRASSOW, PRESIDENT, SOLIDITECH OF HOUSTON, TEXAS

Mr. BRASSOW. Thank you, Mr. Chairman. My name is Carl Brassow and I am with Soliditech of Houston, Texas. We were fortunate enough to——

Mr. TORRICELLI. A little louder please, Mr. Brassow.

Mr. BRASSOW. We were fortunate enough to be selected as part of Round 2, of the SITE program and we completed our demonstration at a site in New Jersey last December.

I think it is important to recognize, and I agree with Mr. Fortuna, that regulatory requirements as well results of other investigations have shown that there is no one single waste remedy or panacea and I think this has been borne out by not only work on Superfund sites, but trying to reach conclusions and approaches to RCRA types of facilities.

Soliditech, in our pursuit of the SITE Program, reasoned that in order to gain credibility in an innovative technology, particularly that was unknown or untried or unaccepted by both the regulatory industry and consultants, was necessary; and that we would have to develop a data base developed under fairly rigid guidelines. We believe that the SITE Program provided those requirements and those rigid types of guidelines that yield the right results.

From our perspective there are four steps in the SITE Program, all of which are very useful to vendors and contractors. The actual process begins with the solicitation of the technology. In order to respond to a solicitation, a fairly detailed proposal has to be presented to EPA to meet the requirements of the program. That forces a certain amount of discipline upon the vendor and the contractor to review their own technology in light of those guidelines to see if they would meet those requirements and it begins an initial first step.

The second part is the actual proposal and a demonstration plan. This is incredibly detailed from our perspective, and again is one more step of internal analysis of the technology to see and to determine whether the vendor or the contractor, or the developer feels that he can meet the requirements of the program.

The third step is the actual demonstration, which is a full-scale program and I agree with Mr. Fortuna, that is where you shake

out all of the little pilot scale, bent scale kinds of problems and it provides a lot of very good data, not only to EPA, but also to the developers themselves.

Finally, the final reporting phase in which all the analytical results are presented and digested and interpreted, which is an important step. We would agree that the overall time to perform the demonstration is one of the larger detriments of the program.

I think, though, that the program has created an environment that private industry has an incentive to come forward with new technologies and apply that technology to the overall hazardous waste program.

I think many of the processes are waste specific, but there are others that are problem specific. That is, solidification for instance, is a wider technology than perhaps some other technologies.

I think the results of evaluating and the results of the SITE Program will be the development of more advancement in those technologies, as well as a fairly competitive industry developing from a review of those technologies. Unless certain technologies are patent-protected, other vendors and other developers will pick up and advance those technologies to higher degree.

One of the problems that I see, and may have been reflected here in comments, is that there appears to be an expectation of perfection on the first round of the SITE Program. The name "innovative technology evaluation" would, to me, militate against that expectation, but I think there is that inherent bias in the program at this time. That the results of any given demonstration are the results, and I think from our perspective that it is a good starting point to indicate those areas that need to be enhanced or developed further.

I think there is one other comment, that I would like to make, Mr. Chairman. You have indicated that landfills tend to be a very expedient type of disposal option. And I would tend to agree with you in the sense that, to the degree that companies are using landfills and untreated waste as very expedient.

I think the combination of the treatment technologies to be applied that will result from the SITE Program, will of necessity require landfills of treated waste, waste that because of the treatment technologies, have to go somewhere. One of the residuals even of the incineration program are still ashes and fly ashes, which require some sort of ultimate disposal. So in the context of untreated waste, I would tend to agree with you, but I believe that there needs to be further incentive to higher orders of treatment and higher orders of repositories for those treated wastes. Thank you.

[The prepared statement of Mr. Brassow follows:]

TESTIMONY BEFORE U.S. HOUSE OF REPRESENTATIVE
SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT
SITE PROGRAM

Ladies & Gentlemen:

I am Carl Brassow, Executive Vice President of Soliditech, Inc. of Houston, Texas. Soliditech was selected by the U.S. EPA as a technology developer to demonstrate our solidification/stabilization process as part of the Superfund Innovative Technology Evaluation (SITE) program. This selection occurred in 1988 as part of the second round of technology solicitations. The actual field demonstration took place in December of 1988 at a site jointly selected in Morganville, New Jersey. Currently, the data developed at the demonstration is under review by the EPA.

The purpose of my testimony is to share some of our experiences as a result of being within the program, offer some opinions as to any benefits or detriments of being within the program and be available to respond to any questions the committee may have.

Perceived Purpose of the Program

Concentrated attention by the public, media, government and industry has resulted in a series of environmental statues and corresponding regulatory programs to address the problem of on-going waste generation and the problem of previous and less than adequate waste management practices. Regulatory requirements have shown that there is no one single waste management technology. Recent investigations of abandoned sites, especially those included on the "superfund" list, have also demonstrated that more and better technologies are required to address this national program.

Within this context, the U.S. Congress has authorized a program to evaluate new and innovative technologies for possible use in cleaning up old and abandoned sites. Many of these technologies will be applicable to the current waste generation problem.

Soliditech, Inc. reasoned that in order to gain credibility for an innovative technology that was in essence unknown or untried to the industrial/consultant community, a data base developed under fairly rigid guidelines was necessary. The SITE program requirements provided these types of guidelines.

The process begins with the actual solicitation of technologies. This step requires the developer to organize and present the technology for initial review and screening. Subsequent rounds of solicitation have improved the screening process. More sophisticated screening will reduce unnecessary duplication of similar processes and increase the diversity of other processes.

Assuming acceptance based on the solicitation proposal, the developer is required to develop in conjunction with EPA contractors, a detailed demonstration plan describing in detail the process, the selected site, the site specific process details, laboratory procedures and quality assurance procedures. Although this may appear to be an unnecessary and overly detailed requirement, I believe this to be a valuable and necessary part of the program to integrate not only technical ability but regulatory sensitivity. This process proved to be invaluable to us in requiring a thoroughly thought-out program to address all concerns.

The actual demonstration is the third step in a four step program. This is the stage that reduces theory to practise and again is an essential step. This is the area where things go wrong that can go wrong. This is true not only of technical questions but of logistic problems, interagency cooperation, public relations and regulatory questions. These problems are the same problems that any EPA contractor would encounter on a full scale project and is a necessary learning experience.

We are currently involved in the final reporting phase which appears to be the slowest part of the overall program. However, this may be attributed to lack of visible activity of the developer's with most of the work conducted by EPA support contractors.

The initial reasoning of Soliditech as to establishing credibility of the data base has been shown to be true. Since announcement of participation in the program, the number and quality of inquiries has risen substantially.

Benefits and Detriments of Program

Overall the SITE program has created an environment whereby private industry has an incentive to develop new or apply technology to the hazardous waste management problem. Many of these processes are waste specific but others are problem specific such as removal of organics from groundwater. More importantly, publication of the demonstration plan and subsequent data base allow other contractors or consultants to advance the technologies if not patent protected. A vigorous (and competitive) industry will develop as the more promising technologies are approved and implemented. Obviously, the

biggest incentive is economic. As actual clean-up work is implemented, acceptable technologies will be used and thus be profitable ventures to the developers.

The greatest disincentives in the program are the extended time required for planning, demonstration and final analysis as well as the cost of the demonstration.

The time to complete a demonstration is lengthy. Part of this can be attributed to the "learning curve" of a new program and part to the process of selecting a viable site. I think economics of time will be realized in the next round because the formats of the technology evaluation report and application reports have now been developed. Although not standardized, these reports are of great value in getting the final data published.

Although the developer's cost has been cited as a disincentive, I don't believe the program structure should be modified to offset this situation. This could easily lead to a disproportionate allocation of funds and in essence EPA would be in the research and development business which would not speed up the review process but would in fact hold back bringing new technologies on-line.

Observations

The SITE program was a first time effort for Soliditech to work with EPA and participate in a government sponsored effort. The effort provided a valuable experience to our company. The working relationships between EPA, contracts and developer were established quickly and worked both efficiently and effectively. Interagency cooperation appeared to be excellent and never posed a problem to Soliditech in the execution of the project.

The SITE program has the potential to bringing varied and useful new technologies on-line for general use. By definition, the technologies in the program are new and/or innovative and will require "fine tuning" after the results are in. Lack of perfect or even expected result should not constitute a rejection of the technology particularly at the regional level.

The program can provide an effective vehicle for giving high visibility to new companies. Lack of visibility and new company images are difficult obstacles to overcome and this is a major benefit that should be retained.

I want to thank the committee for extending an invitation and offering an opportunity for us to express our opinions and views on this most important program.

SOLIDITECH, INC.

Soliditech was established in 1986 for the purpose of providing a solidification/stabilization service to industrial generators of toxic waste using a process that combines pozzolanic materials, a proprietary reagent and other additives with either organic or inorganic wastes. Once the process has been completed, the treated waste will harden into a concrete like material which can be stored with little danger of emitting either liquids of gaseous pollutants into the environment.

Soliditech, Inc. is a wholly owned subsidiary of United Resource Recovery, Inc. a Texas corporation based in Houston, Texas.

Mr. TORRICELLI. Thank you, Mr. Brassow, very much. That is very helpful. Mr. Malot?

STATEMENT OF JAMES J. MALOT, PRESIDENT, TERRA-VAC, INC.

Mr. MALOT. Jim Malot with Terra-Vac. Thank you for the opportunity for sharing with you the experience that we had with the SITE Program.

Terra-Vac developed a vacuum extraction process some time ago. That process is very simple in concept, but rather difficult to apply successfully in the field. Basically it involves installing vacuum extraction wells in the waste material, typically above the water tables, soils, sludges, that kind of thing, inducing the sub-surface vacuum on that material which then propagates laterally, causes in-situ volatilization of the chemicals and extracts them for treatment at the surface. It is very much a source control type of measure; it can be worked with the ground water treatment as well.

When Terra-Vac developed vacuum extraction and applied for the SITE Program, more than three years ago, it was innovative. There was very few opportunities for application of it that the data could then be used to demonstrate to project managers that it was successful.

I think the objectives of the SITE Program at the time were very commendable and the exchange for what we thought would be our investment in the program and the returns from that program, we thought would be positive. However, based on our experience, the implementation of the program, the allocation of funds and the time frame for completing the process really needs to be re-evaluated.

Mr. TORRICELLI. Can you explain your experience a little bit, Mr. Malot?

Mr. MALOT. Okay, when we applied to the program there was some data, roughly estimated at 90 percent of the NPL sites had volatile organics, as the number one contaminant. Our process applies directly to volatiles. However, it took one year to find a site that was suitable for vacuum extraction demonstration. That is a long time for a predominant problem.

Mr. TORRICELLI. It is one year from your initial contact until a site was identified for you to do your testing?

Mr. MALOT. That's right.

Mr. TORRICELLI. What percentage did you say about——

Mr. MALOT. About 90 percent, based on some EPA data that we had at the time. I think that percentage is roughly correlative to what we see now. After that there were several steps of developing a cooperative agreement, community relations, developing a work plan, getting out into the field. Our demonstration was only eight weeks long. Yet just two weeks ago, I received the final report on the evaluation of our demonstration of technology.

Mr. TORRICELLI. It took you a year to make identification, how long then to actually begin work?

Mr. MALOT. It was another 10 months from that point to begin work on the pilot test itself and another year plus to get the results of the evaluation in a published form.

Mr. TORRICELLI. Then a year to get the evaluation from the board?

Mr. MALOT. Yes, we are talking over three years from start to finish for our technology. We are in the first round of technologies evaluated. In that time the technologies become widely accepted, we have applied the technology to more than 70 sites across the country, eight different Superfund sites, virtually every hydrogeologic setting we have come across, more than 40 chemicals that have a volatile character have been extracted and remediated to non-detectable levels. All of this aside from the SITE Program.

Mr. TORRICELLI. Do you own this technology or are you a licensee?

Mr. MALOT. Actually we have two patents on the technology that would tend to prevent some infringement on that, however, we see wide spread use and that is another problem. The——

Mr. TORRICELLI. Did the program——

Mr. MALOT. The SITE Program——

Mr. TORRICELLI [continuing]. Concern with your patent.

Mr. MALOT. I'm sorry?

Mr. TORRICELLI. Did your application to the program and its testing lead you to have any concern about your patent?

Mr. MALOT. At the time the patents were just in the process of being issued, so we did not think that there would be any conflict. However, as the process got developed, it was more of an open forum for our competitors to view our hard-earned field experience in seeing how we apply it in the field and gain their experience. And I felt like we have lost a competitive edge in that regard to applying this technology elsewhere.

Mr. TORRICELLI. If you had to do it again, would you apply to the program?

Mr. MALOT. Based on what I have seen to date, and what I can correlate between the benefits that we have received from the SITE Program, that of expanded marketability and increased potential for application, I would not. The costs that we incurred as a small start-up company and we are not a big, big fortune 500 company, we started out five years ago on my own. And in developing that we anticipated spending about $50,000 in the program; we spent over $250,000 to stay into the program and complete the process. That is a big chunk of money for a small start-up firm. I think there should be some way of compensating those firms, especially start-up firms, and perhaps you could look at it in terms of a comparative level how big the firm is as to what commitment they will be capable of making to the process, but for those that are successful they should get some sort of financial support for the fact that they went out and partially cleaned up a Superfund site.

One of the other constraints that we ran into in the program was that we could not clean up a site within the scope of the program. One of the difficulties I understand is financing, I was there trying to find a small enough site, a portion of a site that we could do our demonstration process on. Our vacuum extraction process is an in-situ process. It is not one that you can just take a representative sample, characterize it beforehand, run it through a black box, characterize it afterwards and evaluate it on simple subtraction of the analytical results before and after. It is one that operates in-

situ, it is a dynamic process, typically takes several months to a couple of years to fully reduce contaminant levels down to typically non-detectable levels that are considered the standard.

So there is a difficulty in fitting our type of technology into the mode of evaluation that was current in the first round. I think with experience, probably we can modify that, but there needs to be some flexibility in how that evaluation is tuned to the particular technology and how that technology is going to work at a full scale Superfund site.

We had the opportunity to work on a very small scale, almost a pilot test scale at a Superfund site, where in, given the time frame, we are talking over three years, we could have cleaned up the entire site in less time. That was based on our original projections and also supported on the evaluation of the data during the site demonstration.

Mr. TORRICELLI. How was the quality of the personnel you worked with throughout the——

Mr. MALOT. The EPA people that we worked with were very responsive to our needs and they were, I think they were very dedicated and worked hard to get through the bureaucratic constraints, but I feel like their hands were tied and they could not make the adjustments that were necessary in a timely manner.

Mr. TORRICELLI. But you felt there were technical strength?

Mr. MALOT. I'm sorry?

Mr. TORRICELLI. You felt there was technical strength with the personnel?

Mr. MALOT. Within the EPA people that we worked with, yes.

Mr. TORRICELLI. I didn't mean to interrupt you before, does that conclude your statement? I just wanted to ask you some questions about it?

Mr. MALOT. Well, there is another, few other problems that I felt that came out of our experience. I mentioned the one with cost. For us to get a return on $250,000 investment requires substantially more, perhaps 10 times or more in contracts awarded based on that.

The schedules, probably the primary difficulties, some of the government contracting procedures with a sole source type of mentality was mentioned before. The cost of the technology versus the cost of the demonstration should be evaluated in the—prior to the demonstration. We could have cleaned up the entire site for less money than it cost to demonstrate it on a small fraction of it.

And the perception of completion by the program, in other words, based that the sites demonstration is completed on our technology, really was not allowed to be done for our technology, we only had a short time frame in which to work with, so we could not really demonstrate it to its full end.

So I think in the solutions, I think their schedule must be matched to the market pace. The pace of the market is much faster than the SITE's Program.

There need to be some relief from the bureaucratic restraints of getting things through the system. And perhaps a simultaneous pursuit of the seven tasks that are listed in the SITE's manual, could accomplish that, rather than a pedantic approach of waiting until one step is complete before you can go onto the next one. If

these technologies are truly promising and warrant the demonstration, there should be a simultaneous push to get all of the things done and that way minimize the time frame. I still feel the goal of 18 months is too long for a technology like ours in the market place that is present.

I think there should be some reward for action and positive results in the, for the offering people and I think you need to protect the developers from losing their leading edge, that they have developed in originating this new technology, with a focus on results.

[The prepared statement of Mr. Malot follows:]

TERRA VAC

THE TERRA VAC's

VACUUM EXTRACTION TECHNOLOGY

AND

EXPERIENCE WITH THE EPA SITE PROGRAM

James J. Malot, P.E.
Principal

Joseph A. Pezzullo, P.E.
Vice President

INTRODUCTION

Vacuum extraction is an in-situ treatment process for cleanup of soils and groundwater contaminated with volatile organic compounds (VOCs), liquid-phase hydrocarbons or semi-volatile compounds. The process of removing VOCs from the vadose zone using vacuum is a patented process. Demonstration of the Vacuum Extraction Technology was conducted under the EPA Superfund Innovative Technology Evaluation (SITE) Program at the Groveland Wells Superfund site in Groveland, Massachusetts from January to April, 1988. The demonstration included an eight-week pilot test to remove VOCs from the underlying soils and groundwater.

Superfund experience with groundwater remediation has shown that where soils are contaminated and allowed to remain in place untreated, the groundwater cleanup process is costly and lengthy. Furthermore, without effective source control remediation, it is likely that the water resource may never again be used for a potable supply.

Terra Vac originally developed the vacuum extraction technology to remediate soils and control source areas. At the time of Terra Vac's application to the Sites Program, vacuum extraction was an innovative technology, since the predominant source control method used at Superfund Sites was excavation. At the time of application, vacuum extraction was ongoing at the a few sites, however, not demonstrated to completion or with sufficient data to consider application at Superfund Sites.

The objectives of the SITE program are indeed commendable. With the high incidence of soil contamination observed at underground storage systems, industrial and Superfund sites, and landfills, it is imperative that new, innovative, efficient and cost effective solutions be found to achieve cleanup objectives. The EPA deserves a lot of credit in their efforts to work with

private industry to demonstrate the innovative technologies that will become the remedial techniques of the future. Special recognition should go to M. Stinson, S. James, and J. Kingscott of the EPA for their hard work and efforts in our SITES demonstration.

However, the implementation of the SITE program, allocation of funds, and the capability of EPA contractors to evaluate an innovative technology (with which they have no previous experience) in a reasonable time frame needs serious reconsideration and restructuring.

The final results demonstrated the effectiveness and success of Terra Vac's Vacuum Extraction Process. In the area at the fringe of the contaminant plume, the average soil concentrations were reduced more than 90% and often to non-detectable levels. Approximately one quarter of the estimated contaminants in place were removed during the short eight week pilot test. Complete remediation of the demonstration site was estimated to take about eight months at a cost of about $40 per cubic yard.

VACUUM EXTRACTION TECHNOLOGY

Vacuum extraction technology effectively removes volatile and semi-volatile compounds from soils and groundwater. Removal of liquid-phase hydrocarbons floating on the water table using vacuum extraction technology is faster and more effective than traditional approaches. Vacuum extraction is typically implemented in-situ, however, the ex-situ treatment of excavated soils on site using vacuum extraction technology is also effective. Groundwater can be removed simultaneously from vacuum extraction wells in a proven process called 'dual extraction' to further enhance recovery of groundwater contaminants and reduce the time frame for total cleanup.

Vacuum Extraction Technology was originally developed by Terra Vac. Since its inception more than five years ago, the technology has been widely used to cleanup soil and groundwater contaminated with volatile organic compounds (VOC). Two broadly applicable process patents exist that relate directly to vacuum extraction and the process of removing volatile contaminants from the vadose zone using vacuum (US Patent Nos. 4,563,760 and 4,665,039). Most successful applications of the technology require a license to use vacuum extraction to remove VOCs from the vadose zone.

Cleanup of contaminated soils using vacuum extraction is often the most important aspect of rapid, cost effective remediation at sites contaminated with volatile organics. A leaky tank or pipeline, surface spill, storage lagoon, landfill or other release can quickly contaminate a large volume of subsurface soil, rock and groundwater. Vacuum extraction removes

contaminants directly from the source area, eliminating further migration in the subsoils and eliminating the continual leaching of contaminants into the groundwater. Implementation can be immediate, without risk of complicating future groundwater clean-up efforts. With the source of the contamination removed, the clean up of groundwater can proceed quickly and effectively.

GROVELAND WELLS SITES DEMONSTRATION

The demonstration of the Vacuum Extraction Technology was conducted under the SITE Program at the Groveland Wells Superfund Site in northern Massachusetts.

The subsurface conditions included multilayered glacial deposits consisting of sands, silty sands and clays. Groundwater was 27 feet deep with a perched water table at about 10 feet. A multilayered vacuum extraction and monitoring system was installed and operated in sub-zero weather and nearly two feet of snowfall.

Objectives of the pilot program included testing of soils before, during and after implementation of the vacuum extraction process. The effectiveness of the process was monitored by measuring subsurface vacuum, rates of flow, rates of VOC extraction and absorption on activated carbon. The system was designed to operate on the fringe of the contaminant plume and to quantify the level of cleanup that could be achieved by the process.

Had we been allowed to clean up the whole site within the demonstration program, many of the complexities and delays of the demonstration and evaluation would have been avoided. The original design was based on previous studies and used six barrier wells to prevent the migration of contaminants from the primary source area into the demonstration area. However, soil samples obtained by EPA in the demonstration area revealed the highest soil concentrations measured by previous studies. Hence, this disparity between previous data and present data significantly complicated the implementation, results and evaluation of the demonstration.

A multi-layered vacuum extraction and monitoring system was installed to segregate the upper sand zone from the lower glacial till. The vacuum extraction system consisted of four extraction wells and four monitoring wells; each was capable of extracting contaminants separately from above or below a three foot clay layer situated at a depth of about ten feet. This provided effective hydraulic separation of the two more permeable units (sand and till) and allowed differentiation of the contaminants extracted from the two zones. Activated carbon was used to control emissions from the site.

During the SITE demonstration, Terra Vac removed about 1300

pounds of VOCs from the subsoils during the eight week pilot test. The mass of VOCs in place is estimated at approximately 5000 pounds. The VOC removal was confirmed by analyses of the activated carbon that was used to collect extracted VOCs. It was projected prior to the demonstration that one to two years would be required to clean up the entire site. The EPA analysis of the SITES data indicated that the demonstration area could be fully remediated in about eight months. These factors indicate that the entire site could be remediated in half the time it took to evaluate the vacuum extraction technology under the SITES Program.

The results of the demonstration indicated contaminant levels in soils on the order of 10 ppm were reduced to non-detectable levels. In areas with higher contamination (i.e. greater than 100 ppm in soil) contaminant concentrations in soils were reduced about 96% during the short eight week pilot test. The average reduction in VOC concentrations in clay soils (where significant contamination was present) was reduced about 96%. Similarly, in the sands, concentrations were reduced 89%.

Overall, the Terra Vac Vacuum Extraction Process was successfully demonstrated in the EPA SITE Program. As a result of this successful demonstration, Terra Vac is currently continuing the cleanup for the owner of the manufacturing facility on the site.

TERRA VAC'S EXPERIENCE WITH THE SITES PROGRAM

As EPA moves into its fourth year of the Superfund Innovative Technology Evaluation Program, the primary objective of finding and evaluating new innovative technologies which can abet the clean up of our nations contaminated soils and groundwater appear well intact. However, something has been lost along the way. Certainly there are still Superfund sites that require cleanup (probably more sites have been added to the National Priority List (NPL) than have been cleaned up). The technologies are still there, albeit substantially improved and being applied elsewhere, in spite of the program. They are, in many cases, being implemented more quickly and for substantially less cost than for what the government can spend to evaluate them.

Terra Vac pioneered and developed the vacuum extraction technology to clean up soils and groundwater contaminated with VOCs. At the time of application to the SITE program in 1986, Terra Vac had developed one of the most promising innovative technologies to clean up Superfund sites. Four years ago the Terra Vac process was being labeled as "unproven" technology, even though the process was initially developed over six years ago at a site in Puerto Rico which later became a Superfund Site. Under the pre-SARA guidelines "unproven" technologies were often exempt from further consideration at the stage of the Feasibility Study. By contrast, the "proven" technologies used instead of

vacuum extraction, such as excavation, removal, and landfilling have been proven to fail, yet they are still indicated in Record Of Decisions's (RODs).

It has been almost four years since Terra Vac's application for the first round of innovative technologies was accepted for evaluation, and EPA is just now publishing the results of the pilot test completed over a year ago. The market place is moving much faster than the SITE Program. If we had waited for the SITE results to promote and implement our technology, Terra Vac would be either bankrupt or substantially behind our competitors in experience.

However, since our application was made, vacuum extraction has become widely accepted, primarily due to Terra Vac's independent efforts to develop, promote, and successfully implement the technology.

It is clear that our competitors benefited more from the SITE Program than Terra Vac. Numerous companies have usurped the technological advances made by Terra Vac that were publicized in the SITE program. Several other companies have used our demonstration to further their use of vacuum extraction technology, even though two patents were obtained on the process to protect infringement.

Now, the SITE program is an open forum for Terra Vac's competitors to obtain first-hand knowledge of our hard-earned innovations and specialized field operations. The marketing edge that was purported by EPA to benefit Terra Vac from the program has long past during the four year EPA evaluation.

It appears that had we directed our efforts toward expanding our market instead of participating in the program, we would be substantially better off and our competitors less so; especially since they benefited from the technology demonstration and didn't spend a dime. Needless to say, the $250,000 investment that Terra Vac spent working on this project has far exceeded the immediate return on our investment. In order to recoup our investment in profit dollars, we would need $3 million dollars in revenue generated as a direct result of the program. We can only hope that the marketing payoff promised by the program will eventually evolve.

It seemed that the hype of the original SITE program was that it would generate promising notoriety for the entities performing the demonstrations, and that no payment would be made to these firms since they stood to receive a considerable return on their investment in the SITES Program from future business if the demonstration proved successful. However, what occurred with our firm, a small start-up company, was that we often had to borrow money to maintain our involvement in the SITE Program.

Since the beginning, bureaucratic idiosyncrasies have burdened

the project with excessive delays and costs. For example, the first task, finding an appropriate site, was a challenge. With more than 600 sites on the NPL from which to choose for the application of a technology suited for in-situ treatment of VOC contamination, one would think finding a site to clean up would not be too difficult. But, it took one year to choose a site, even though, according to EPA statistics, volatile organic compounds (VOCs) are the major contaminants at about 90% of the sites.

Once the site was selected, the team of well-intending scientists met to consider how the round peg of technology might be jammed into the square hole of bureaucracy. A number of constrains were placed on the demonstration from those far remote from the program. Therefore, the consideration of the relative cost effectiveness of altering the constraints for the more appropriate evaluation of the technology was beyond the authority of anyone directly involved. These constraints fell into the following categories:

1. Schedule
2. Government contracting procedures.
3. Cost (not how much, but who got paid for what)?
4. Which soils could be cleaned up and to what extent?
5. The method of evaluating an in-situ treatment process

The pilot test was initially scheduled for September 1987 in Boston. However, after numerous delays due to EPA contracting procedures, work plan development, review, approval, public notice, subcontracting, and additional approvals, the pilot system was started in January, 1988. Hence, Terra Vac incurred substantial costs of winterizing the system for continuous operation in sub-zero weather.

Government contracting procedures caused numerous delays and inflexibility during the demonstration. Numerous attempts to begin drilling for the initial sampling and vacuum extraction well installation were aborted due to delays in EPA's contractors in coordinating field operations.

Once the demonstration got started, tens of thousands of dollars were spent disposing of perched groundwater removed during the process. The alternative of treating on site with activated carbon for 1/15th the cost was rejected. In fact, that is exactly what was subsequently approved by EPA Region I for the ongoing clean up at the Groveland Site, and Terra Vac is presently doing on site treatment and disposal of extracted groundwater.

Furthermore, the process of evaluation which drives the SITE Program consists of: 1.) identifying and segregating a waste type (e.g. soils contaminated with volatile organic compounds); 2.) characterizing the waste (e.g. initial concentration); 3.) implementing the innovative technology on the waste; and 4.) characterizing the waste after the innovative process is

complete. Typically, this type of evaluation is consistent with a batch type, ex-situ waste treatment process. However, this method of evaluation is not applicable to a dynamic, in-situ process such as vacuum extraction, since the physical laws governing the application of the technology do not render themselves to short term batch type evaluations. The program requires the flexibility to set up an evaluation that is consistent with the dynamics of the technology being evaluated.

It appears that the relative cost to pay the offering contractor for the clean up achieved during the demonstration pales compared to the million dollars spent on EPA contractors during the program. Why is the money spent to produce paper, yet none goes to the folks who go out there and do the dirty work and actually get things cleaned up ? Terra Vac cleaned up about one fourth of the soil contamination at a Superfund Site yet didn't get paid a nickel for it. A redirection of priorities toward funding action and positive results as opposed to just paying for the study is appropriate.

What has been lost, or never was intact in the first place, was the idea of cost effectiveness. Taxpayers really take a beating when the government allocates over a million dollars to demonstrate a technology on a mere sliver of a Superfund Site when the entire site could be totally cleaned up for half the price. Terra Vac routinely performs remedial services at such larger sites than that used during the demonstration and at a fraction of the cost. So, the basic question is, "How can the EPA adequately evaluate not only the effectiveness of an innovative technology, but also provide for cost effectiveness during a SITE demonstration ?" Part of the answer is flexibility and rapid evaluation.

We haven't all the answers, but in our SITES experience, it would have been more effective, provided clear results, and cost less if Terra Vac was allowed to clean up the entire site using our standard approach (which we proposed). Instead of taking four years and over $1.3 million to evaluate the pilot process under the SITE Program, Terra Vac could have cleaned up the entire volume of soil contamination (about 20,000 cubic yards) in two years and at half the cost. Then, the evaluation would have been straightforward, and could have been summed up in three sentences: "Initial soil concentrations were over 1000ppm. Final soil concentrations are non detectable. Terra Vac's Vacuum Extraction Technology was successful."

Mr. TORRICELLI. Thank you, Mr. Malot, very much.

Mr. MALOT. Thank you.

Mr. TORRICELLI. Mr. Brassow, how does that compare with your experience in the time from contact to siting, to report?

Mr. BRASSOW. Our time frame was much shorter. We submitted our proposal late in 1987, we actually demonstrated in December of 1988, about a year later. We are now in the——

Mr. TORRICELLI. How long then to get the results?

Mr. BRASSOW. We are now working on the second draft of the technology evaluation report and the first draft of the applications report has been submitted. I recently attended a conference in Atlanta sponsored by EPA and there was a developers' meeting there and EPA clearly stated their intentions not only to move that along, but also to address some concerns about getting the results into the hands of the RPM's and industry so they can utilize that on a quicker basis. So——

Mr. TORRICELLI. You are both marketing, obviously, outside of EPA, directly to [unintelligible] companies as well. Do you share some of what Mr. Fortuna said before, Mr. Skinner and others said too, the concern of companies, their confidence in the technologies, with or without federal testing? That there is just a reluctance to have confidence in the technology, that is leading them to continue to use less creative alternatives?

Mr. MALOT. I would say at the beginning of our application to the SITE Program, that was a significant problem with us. We had demonstrated at a few industrial sites, with positive results. However, we were not allowed to use those results in marketing to others. Every industrial clients particularly are very protective——

Mr. TORRICELLI. They do not want you to use them?

Mr. MALOT [continuing]. Of their results, right. So that was a difficulty and still is.

Mr. TORRICELLI. So, whether or not the SITE Program leads to federal work, simply the fact that it was tested, that you could use the results, is a good market for it?

Mr. MALOT. It would have been, had it not, had the technology become widely accepted within the time frame before the report goes out. The report I just got, you know, last week, I have not been able to use it as a marketing tool. Now, perhaps we can. But in that time frame we have been diligently pursuing developing the technology outside and as a result have demonstrated it and our ongoing clean ups and have completed several clean ups at more than 70 sites. So——

Mr. TORRICELLI. Mr. Brassow, what do you think of that point?

Mr. BRASSOW. Well, I would agree to a point. You see, our solidification process involves an aspect of the organics. And some of our results are very, very encouraging about its use with certain levels of organics. That is the kind of information that industry is very reluctant to accept without the kind of thorough analytical results that is coming out of the SITE Program. If a vendor was to go to an industry client, or an RPM without some other data base, and make those types of claims without a thorough analytical data base, it's very, there is no confidence in that. So the SITE Program to us in this aspect, lends a great deal to that credibility.

Mr. TORRICELLI. How much did it cost you to go through the process?

Mr. BRASSOW. About $75,000. So I mean, even though we are, again I would share the same concerns, we are a new start-up company and it is costly. We feel that that cost is an investment in the long term, because I believe that solidification is a technology, not only to be applied to Superfund and remediation process, but ultimately in addressing the RCRA problems of treatment standards [unintelligible] and that whole regulatory scheme in RCRA. So we view it a little bit different, much more broadly than just a remediation technology.

Mr. TORRICELLI. Well, I thank you each. I do not have any further questions. Mr. Fortuna, I would be particularly grateful if you, in particular, you had some other thoughts I suspect on how to integrate SITE into remedy selection. That is a real interest of mine and I suspect of the committee's on how to move forward now legislatively the SITE Program which needs some redefinition or midcourse correction. If you have thoughts on how to do that, I would be very grateful to receive them.

I appreciate your help today and your testimony, indeed that of the other panelists as well. This is a program of which I am enormously proud. I think one of the best things this committee has done in a number of years. We turned a very important corner. This country started to celebrate the meeting of its toxic waste problems very prematurely. We were celebrating and we were doing no more than playing a shell game of moving toxic materials from one site to another. That is not solving a problem. Solving it is destroying it. And the answer to destroying them is in the same minds, some of the same institutions, some of the same technologies that created some of the problems to begin with. That genius clearly exists in the country. We have to let it loose. I hope the SITE Program is a contribution to doing that.

It clearly is not a perfect answer. It clearly needs to be revisited three years into its brief life. But that is why we wanted your advice today, to find out how to take that next important step and, as its original author, this has helped me a great deal in understanding how to take that next important step.

So, you have been very patient. Your comments have been very thoughtful, very thorough without exception, and I appreciate it very much and Mr. Fortuna, in particular, I appreciate any correspondence from you. But as you leave here today as well, please feel that you are part of a continuing process. As you have thoughts, ways we can improve the program, please, anyone who was here today, correspond with us and let us know; we want to make this work.

Thank you for your participation. This committee hearing stands adjourned.

[Whereupon, at 11:38 a.m., the subcommittee was adjourned.]

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APPENDIX

United States Environmental Protection Agency | Office of Solid Waste and Emergency Response Washington DC 20460 | Office of Research and Development Washington DC 20460

Superfund | EPA/540/5-89/009 Mar. 1989

EPA

The Superfund Innovative Technology Evaluation Program:

Progress and Accomplishments Fiscal Year 1988

A Second Report to Congress

NOTE: This report may be obtained, free of charge, by calling 513-569-7391, or by writing to the Center for Environmental Research Information, 26 West Martin Luther King Boulevard, Cincinnati, Ohio 45268.

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